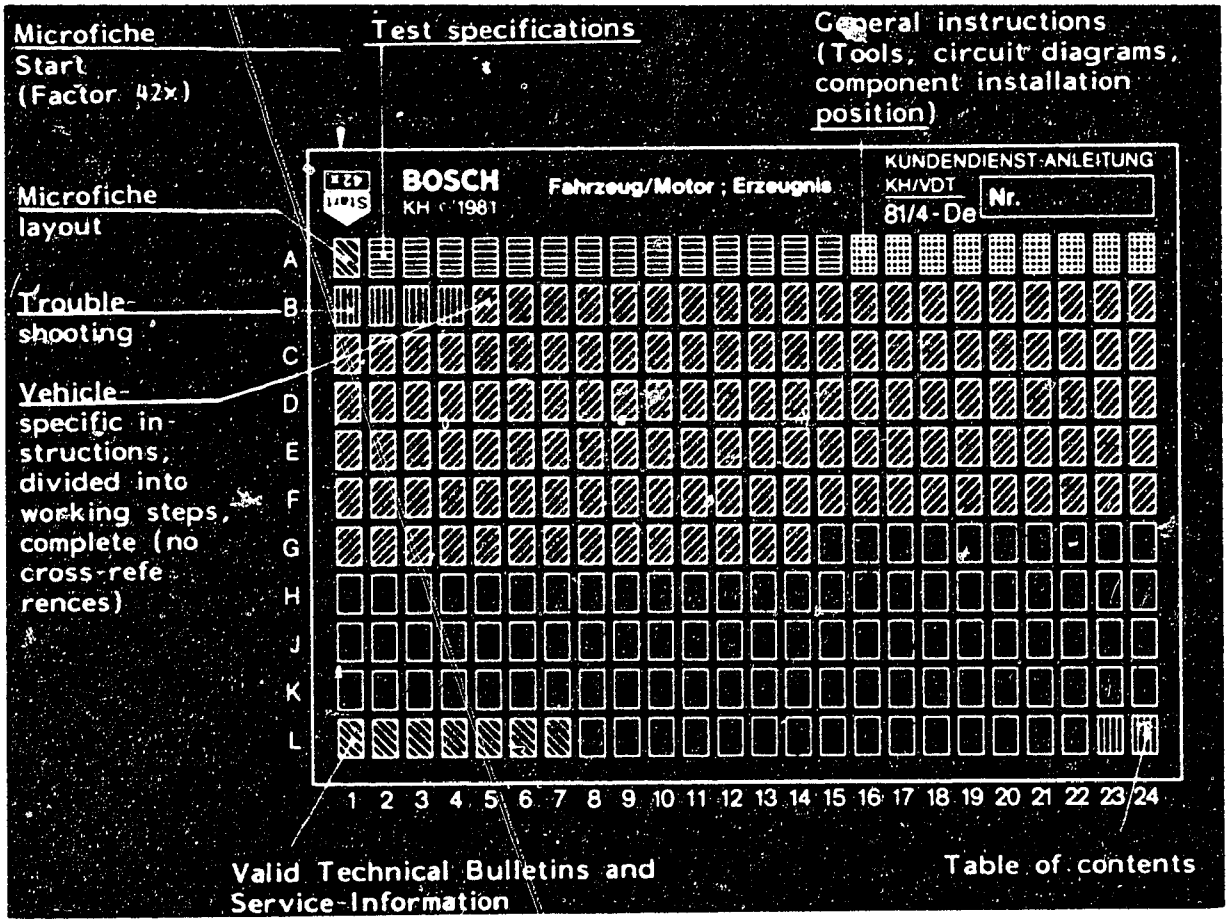
Microfiche layout



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

E16	Product/assembly/test step Vehicle/engine	

Coordinate

3. Limits of section

Beginning | Mid-section | End | One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

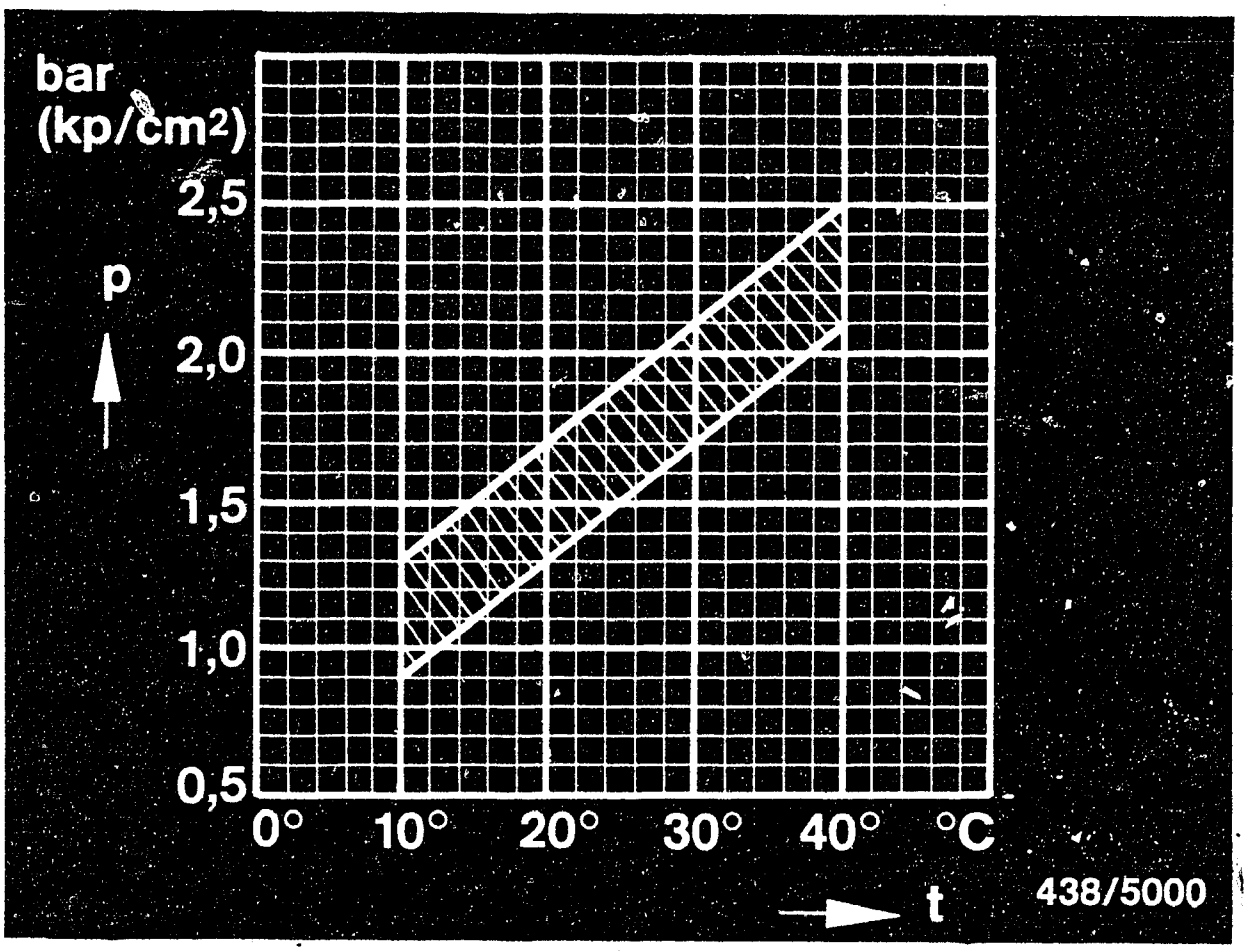
C6

1. Test specifications

1.1 Electric fuel pump

B21

Test step	Test specifications
Fuel delivery:	min. 750 cm^3/30 s



p = Control pressure (gauge pressure)
t = Ambient temperature

1.2 Control pressure "cold"

C8

Part No. of warm-up regulator:

0 438 140 011

Test step	Test specifications*
1.3 Control pressure "warm" — **C8**	
Warm-up regulator Part No. 0 438 140 011	3.4...3.8 bar (3.5...3.9 kgf/cm²)
1.4 Primary pressure — **C21**	
Checking value:	4.5...5.2 bar (4.6...5.3 kgf/cm²)
Setting value:	4.7...4.9 bar (4.8...5.0 kgf/cm²)
1.5 Leak test — **D6**	
Minimum pressure after 10 minutes: after 20 minutes:	 2.0 bar (2.1 kgf/cm²) 1.7 bar (1.8 kgf/cm²)
1.6 Injection valves — **D19**	
Opening pressure: Part No. 0 437 502 013 (1979 model)	 2.7...3.8 bar (2.8...3.9 kgf/cm²)
0 437 502 015/016 (1980 model)	3.0...4.1 bar (3.1...4.2 kgf/cm²)

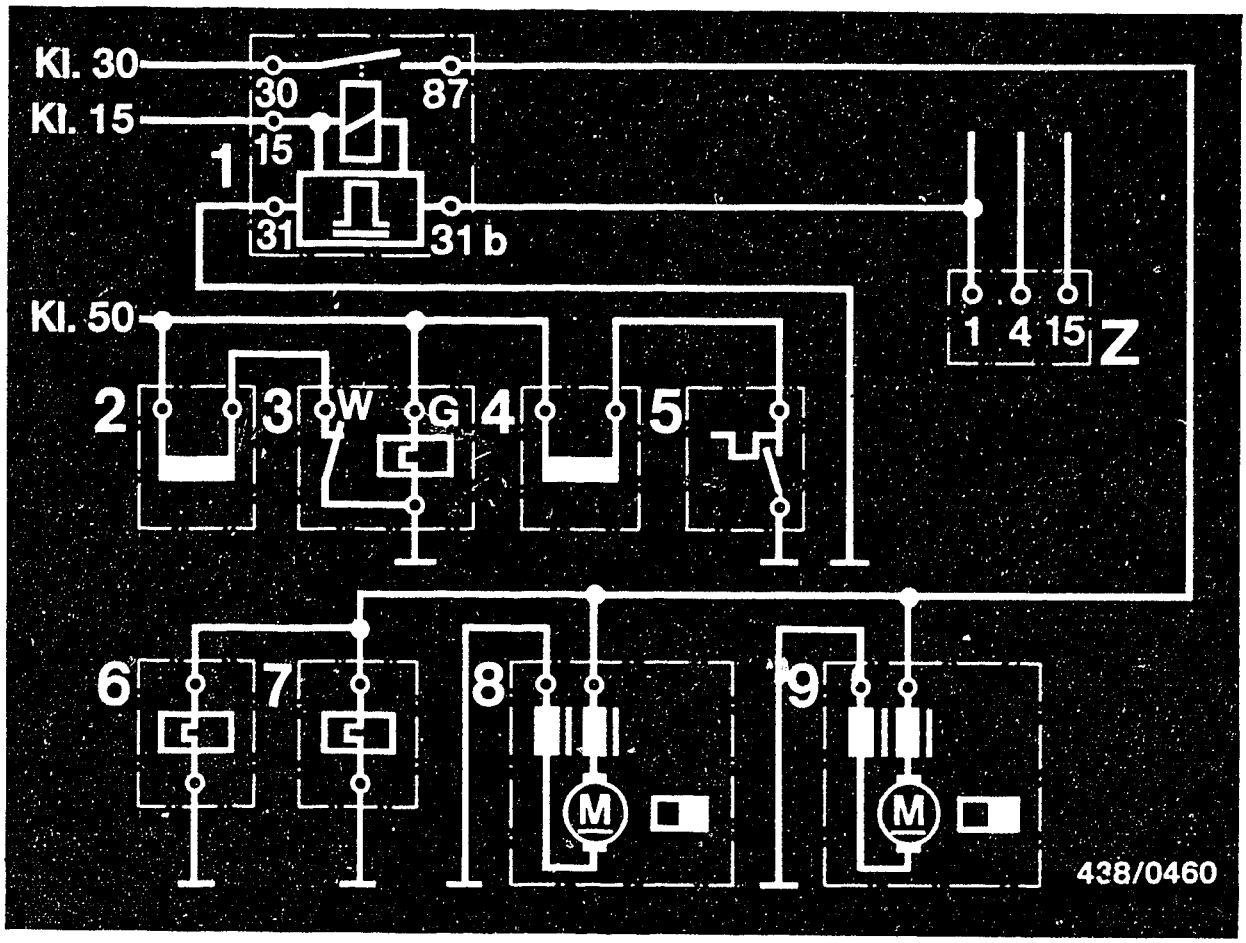
*Pressures in the test-specification table are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).

Test step	Test specifications*
E18	
1.7 Idle-speed adjustment	Note: Engine oil temp. 80...90°C
1.8 Idle speed	
All models	900...1000 min^{-1}
1.9 CO concentration (% by vol.)	
All models	1.0...2.0 %

E6

1.10 Fuel distributor

Delivered-quantity comparison	Setting point cm^3/min	Max. allowable delivery cm^3/min
Idle	6.0	6.8
Part load	40.0	44.0
Full load	160.0	175.0



Kl. = Terminal

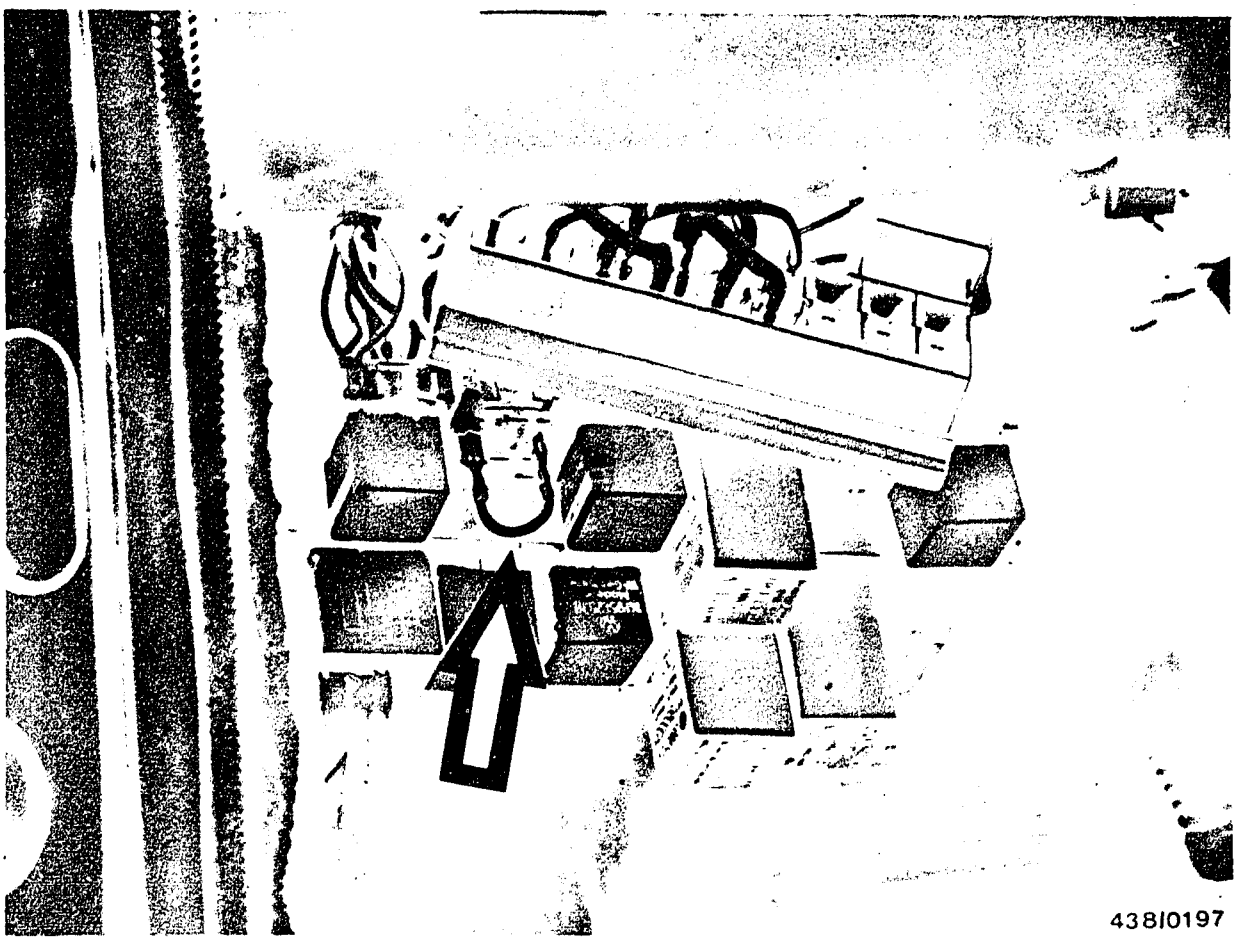
2. Electrical safety circuit

2.1 Electrical circuit diagram

1 = Electronic rotational-speed relay
2 = Start valve
3 = Thermo-time switch
4 = Solenoid-operated valve for control-pressure reduction
5 = Thermo-switch for control-pressure reduction
6 = Warm-up regulator
7 = Auxiliary-air device
8 = Pre-supply pump
9 = Electric fuel pump

Z = Ignition coil

As from the 1979 model, the electric fuel pumps, warm-up regulator and auxiliary-air device are triggered by an electronic rotational-speed relay. The air-flow sensor contact used for triggering up to the 1978 model is no longer used.



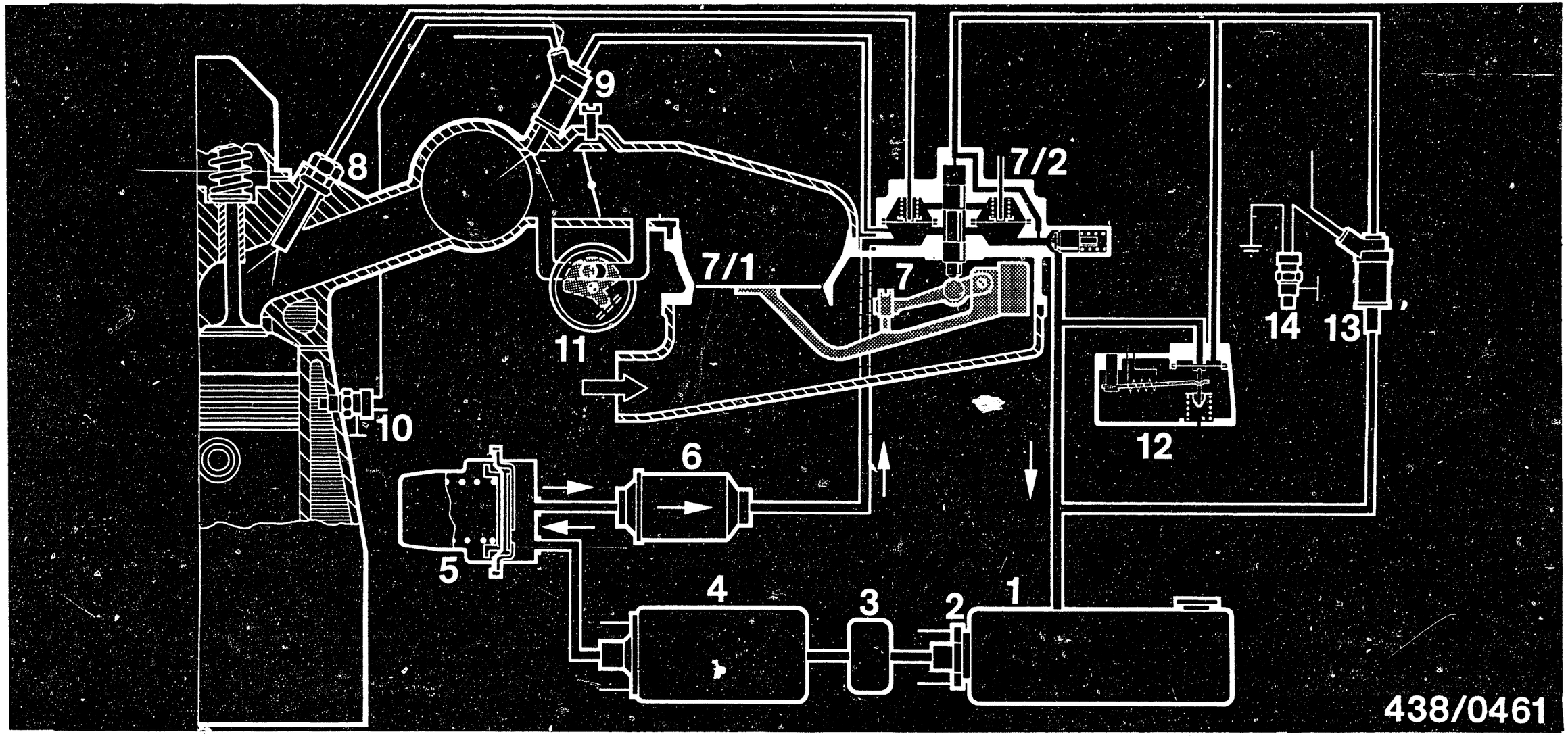
43810197

2.2 Bridging the safety circuit:

Remove the electronic rotational-speed relay from the central-electrics console. The console is located in the left-hand footwell under the instrument panel.

The rotational-speed relay is the second relay from the left in the upper row.

For bridging, connect contacts 30 and 87 with a connecting cable (arrow). Connecting cable 1.5 mm².



3. Diagram of fuel lines.

1 = Fuel tank
2 = Fuel pre-supply pump (non-Bosch product, as from 1980 model)
3 = Fuel pre-filter (non-Bosch product, up to 1979 model)
4 = Electric fuel pump
5 = Fuel accumulator
6 = Fuel filter
7 = Mixture-control unit
  7/1 = Air-flow sensor
  7/2 = Fuel distributor
8 = Injection valve
9 = Start valve
10 = Thermo-time switch
11 = Auxiliary-air device
12 = Warm-up regulator
13 = Solenoid valve for control-presssure reduction
14 = Temperature switch for control-pressure reduction

A8	Diagram of fuel lines Porsche 924, 1979/1980 models	→

A9	Diagram of fuel lines Porsche 924, 1979/1980 models	←

4. General information

- K-Jetronic version in the vehicle model without lambda closed-loop control (1979 model worldwide and 1980 excluding USA, Canada, Japan):

- The overall system of the K-Jetronic corresponds to the basic version as described in Technical Instruction VDT-U-3/1 En.

- The air-flow sensor is of the updraft version.

- The primary-pressure regulator in the fuel distributor is without a combined push-up valve in all Porsche 924 models.

- Modifications to the K-Jetronic as compared with the previous models 1976...1978.

- Instead of the 2 fuel accumulators each with 20 cm^3 storage volume, one 40 cm^3 accumulator is installed.

- As from the 1980 model, a fuel distributor with adjustable differential-pressure valves is installed. In this type of fuel distributor, screw plugs are situated adjacent to the fittings for the fuel-injection lines.

- This possibility for adjustment has only been introduced for production at the works. This does not result in any additional adjustment possibilities for the After-Sales Service Organization. For this reason, the fuel distributor is to be dealt with in precisely the same manner as the conventional model. The screw plugs must not be removed or loosened.

4.1 Pre-supply pump, electric fuel pump:

- As from the 1980 model, a pre-supply pump (not made by Bosch) is installed as standard directly in the fuel tank. When testing the electric fuel pump (testing the fuel delivery) the possible influence of the pre-supply pump should be borne in mind.

4.2 Prefilter:

- Up to and including the 1979 model a prefilter was installed which was positioned in the intake line between the fuel tank and the electric fuel pump.

- With the introduction of the 1980 model with a pre-supply pump the separate prefilter is dispensed with and is replaced by a filter built into the pre-supply pump.

- Note: According to Porsche servicing instructions, the separate prefilter (up to 1979) should be changed at the same intervals as the main fuel filter.

- The filter built into the pre-supply pump as of the 1980 model cannot be replaced. Should this filter be the cause of inadequate fuel delivery, replace the complete pre-supply pump.

4.3 Fuel-injection lines:

- As from the 1980 model use is made of steel fuel-injection tubing with a flexible polyamide intermediate piece (to compensate the vibrations between mixture-control unit and engine).

- Note: In order to prevent damage to the tubing, it must only be bent slightly in the polyamide area. For this reason, connect the tester for delivered quantity comparison KDJE 7451 or KDJE-P200 only with the adapter lines KDJE 7451/25 or KDJE-P200/25.

4.4 Solenoid-operated valve for control-pressure reduction for hot starting:

- In order to improve the hot-starting performance, a solenoid-operated valve (similar to a start valve) is fitted as standard and is connected to the control-pressure line between the fuel distributor and the warm-up regulator.

- The fuel outlet side is connected via a hose line directly to the return line to the fuel tank.

- The electrical triggering is from terminal 50 (positive) and a coolant-controlled thermo-switch (negative) which closes at an engine temperature above 45°C. Due to the open solenoid-operated valve the control pressure is reduced to approx. 0.5 bar gauge pressure when hot-starting. It is thus considerably lower than the control pressure normally determined by the warm-up regulator which is higher when the engine is hot. In this way, the fuel quantity is increased by a specific amount during hot starting.

- Note: The described auxiliary hot-starting device has in some cases been retrofitted in earlier 924 vehicles by the Porsche after-sales service. In such cases, the thermo-switch is designed for 70°C and is mounted on the engine block by a mounting piece.

4.5 Vacuum limiter

- The vacuum limiter was installed in the Sweden version with manually-shifted transmission up to the 1979 model.

- This is a vacuum-controlled auxiliary-air device which only opens on the overrun. In all other operating conditions the vacuum limiter must be tightly closed.

When trouble-shooting the K-Jetronic it is assumed that the ignition is in order and that the engine is in proper mechanical condition.

The individual test steps of this repair manual are detailed and self-contained. This permits direct trouble-shooting without having to go through the entire test program for each fault.

The trouble-shooting chart on Coordinates B1 - B4 is intended to make is easier to decide which test steps have to be performed for certain faults.

According to the symptom stated by the customer or which you have determined yourself, select the possible cause in the trouble-shooting chart. The coordinate at the end of the cause column refers to the appropriate test step with the associated test specification.

Important note:
If any fuel connections are loosened, parts removed (also on the vacuum system), always use new seals when reconnecting or when re-installing.

Ensure utmost cleanliness when working on the K-Jetronic. Fuel connections must be cleaned thoroughly on the outside before opening.

5. Test equipment and tools

5.1 Pressure tester KDJE-P 100 (previously KDEP 1034).
For testing all fuel pressures and testing for leaks.

5.2 Adjusting wrench KDEP 1035.
For adjusting the idle-mixture-adjusting screw in the mixture-control unit.

5.3 Guide ring KDEP 1040/10 (dia. 80 mm).
For centering the air-flow sensor plate in the air-flow sensor.

5.4 Tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451).
For comparing the fuel delivered from the individual fuel-distributor outlets.

5.5 Line set KDJE-P 200/25 (previously KDJE 7451/25).
For connecting the tester for delivered quantity comparison KDJE-P 200 in the 1980 Porsche 924 model, with steel injection tubing.

5.6 Graduate (commercially available, capacity approx.1.5 l).
For measuring the delivery of the electric fuel pump.

5.7 Electric connecting cable (test lead).
KDJE 7450/70 for the direct connection of components to be tested, e.g. cold-start valve.

5.8 Valve tester KDJE-P 400 (previously KDJE 7452).
For testing the injection valves.

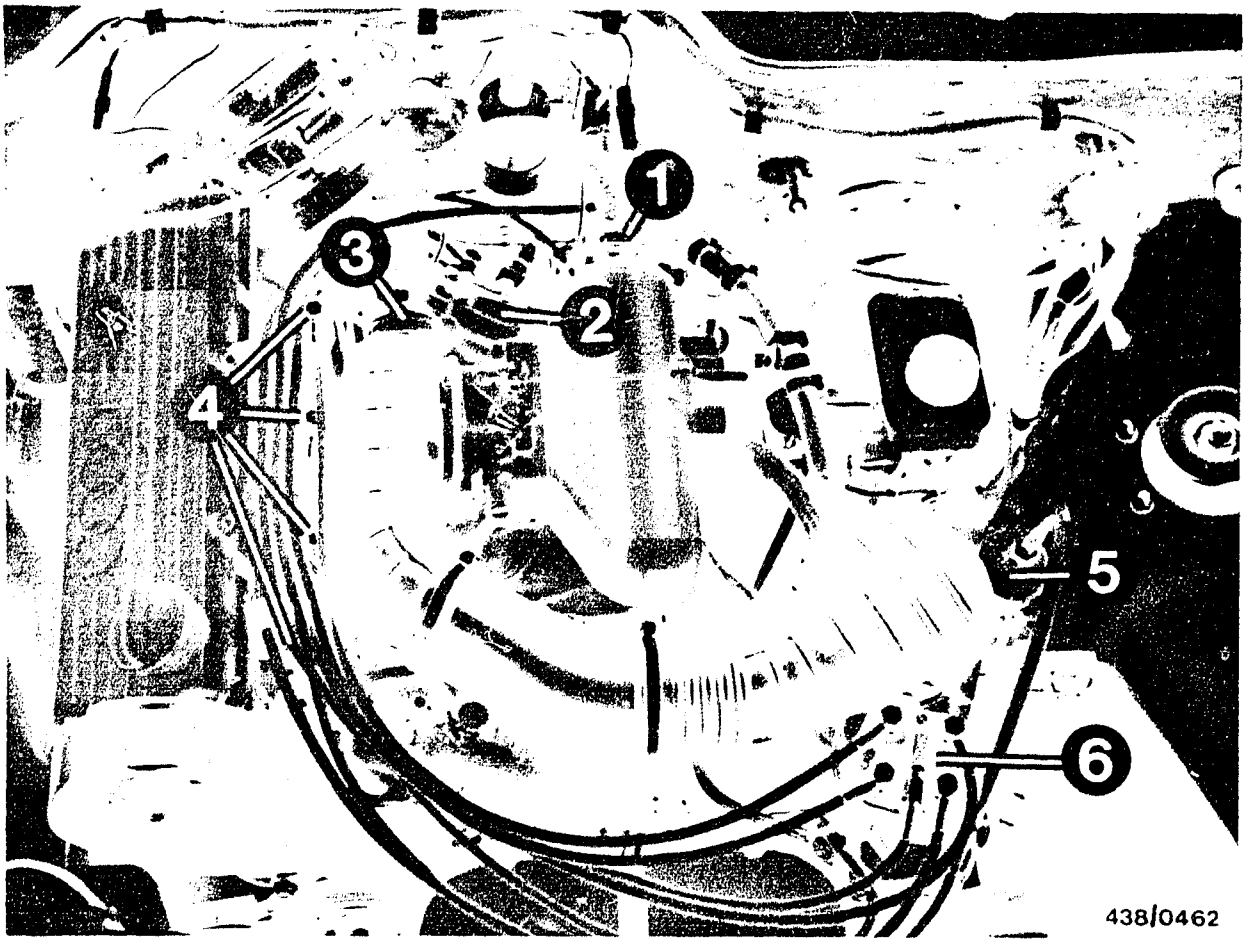
Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135)
or
Bosch, Part No. VS 14 942-CH
Former Part No. 5 973 340 650
The calibrating fluid can be obtained in 5 l metal cans from the following supplier:
Firma
Oskar Gnamm GmbH & Co
D-7531 Kämpfelbach-Bilfingen

Caution: For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids. Even with calibrating fluid, be sure to observe the local official regulations.

5.9 Tachometer (commercially available)
For idle-speed adjustment.

5.10 CO meter (commercially available)
For idle-speed CO adjustment.

5.11 Tool set for removing and fitting the idle-speed anti-tamper device (e.g. No 4521/7 from Hazet Co., 5630 Remscheid).

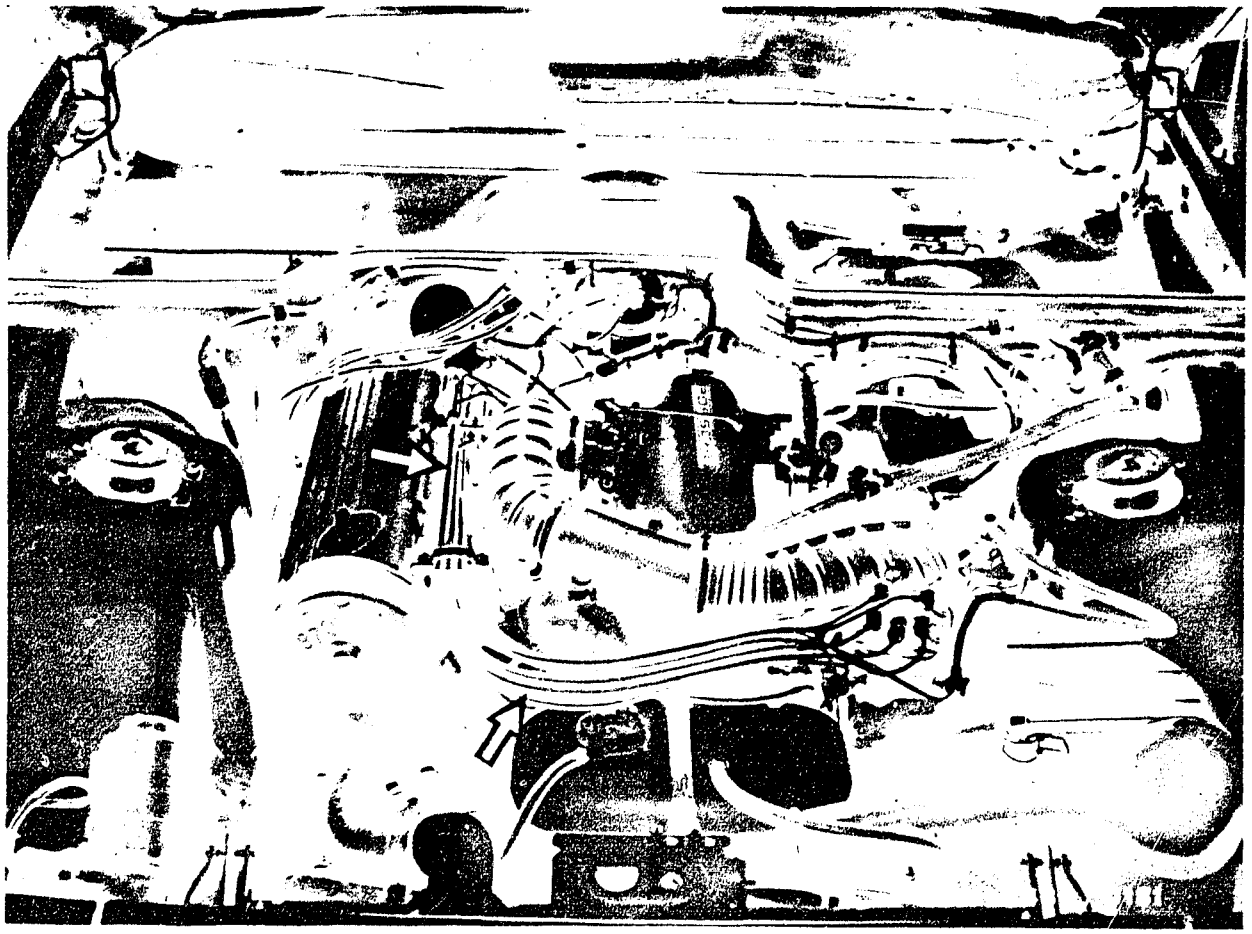


6. Installation position of individual components

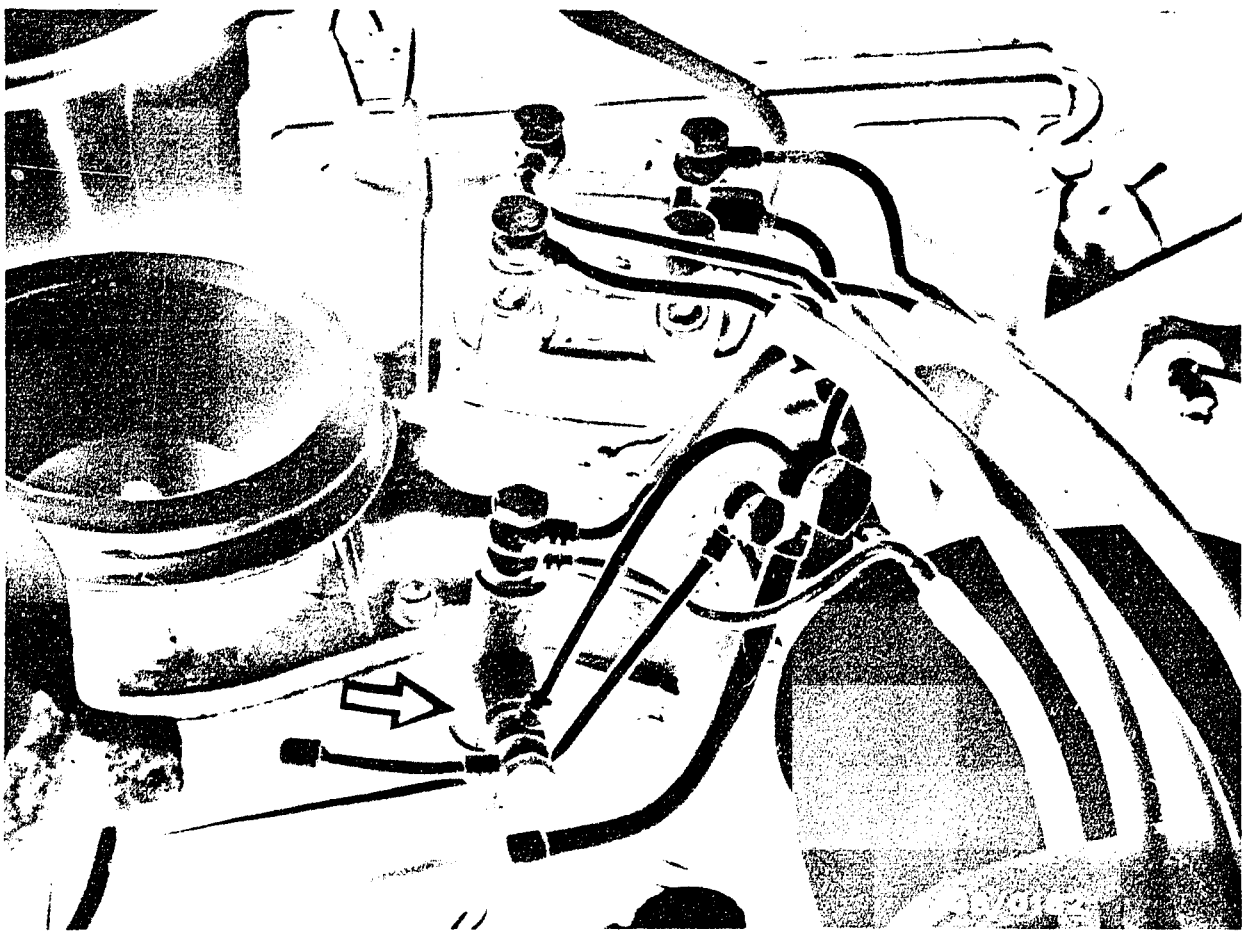
Arrangement of components on the engine:

Illustration shows 1979 model.

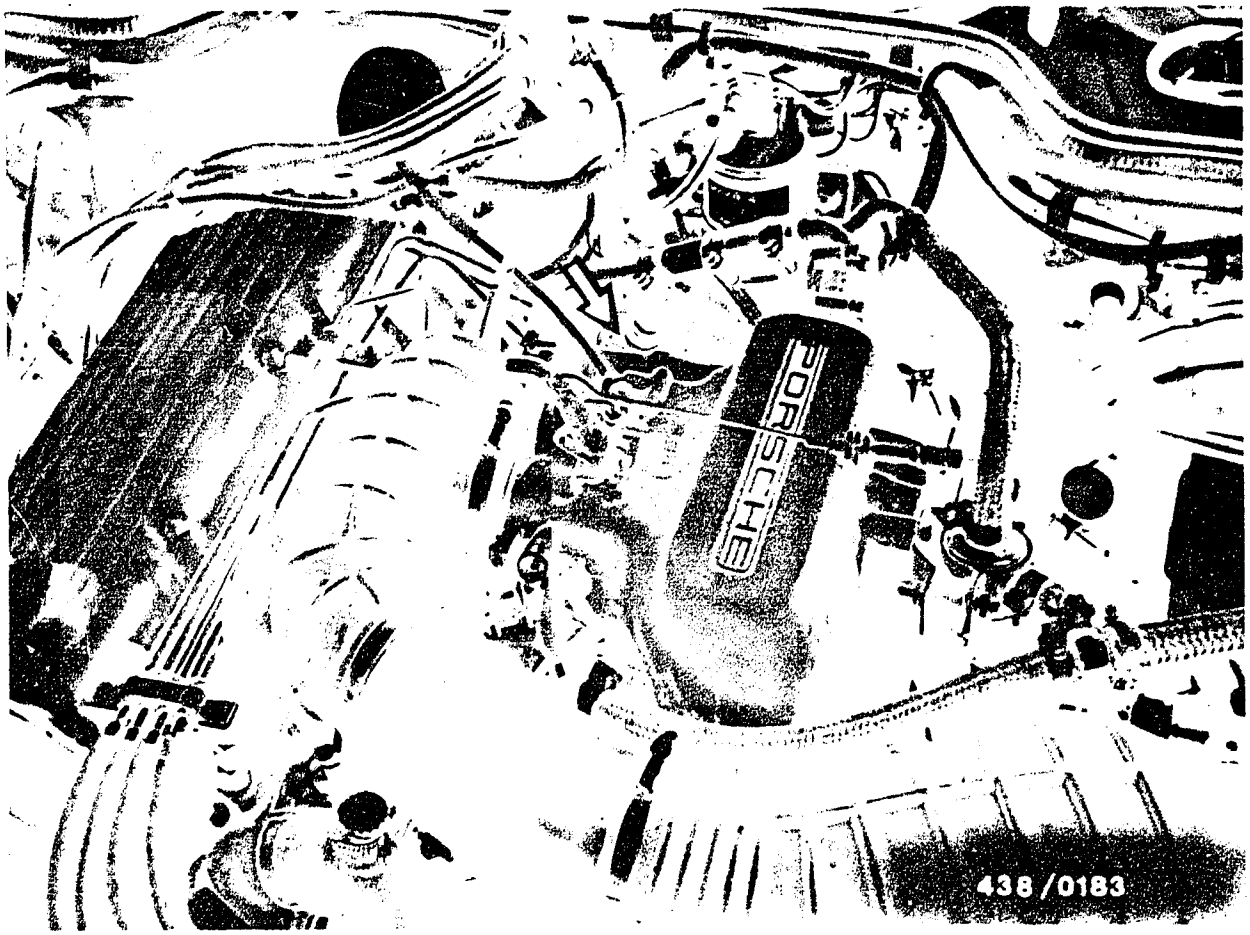
1 = Start valve
2 = Warm-up regulator
3 = Auxiliary-air device
4 = Injection valves
5 = Fuel filter
6 = Mixture-control unit



1980 model with steel/polyamide injection lines (arrow).

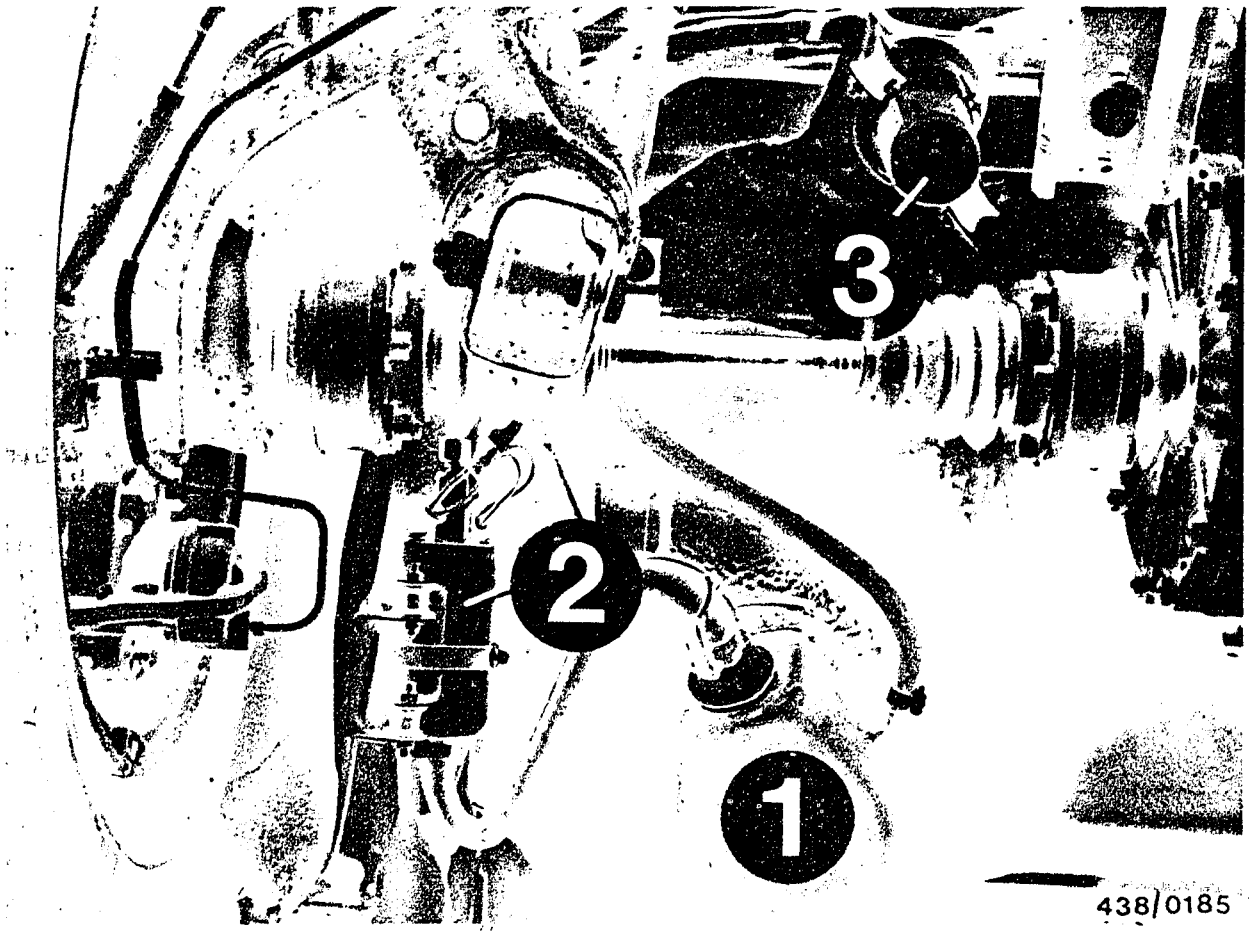


The solenoid valve (non-Bosch product, for control-pressure reduction) is flanged onto the bracket for the mixture-control unit.



The thermo-switch (not made by Bosch) for triggering the solenoid-operated valve (control-pressure reduction) is installed in the coolant return flange (from the cylinder head).

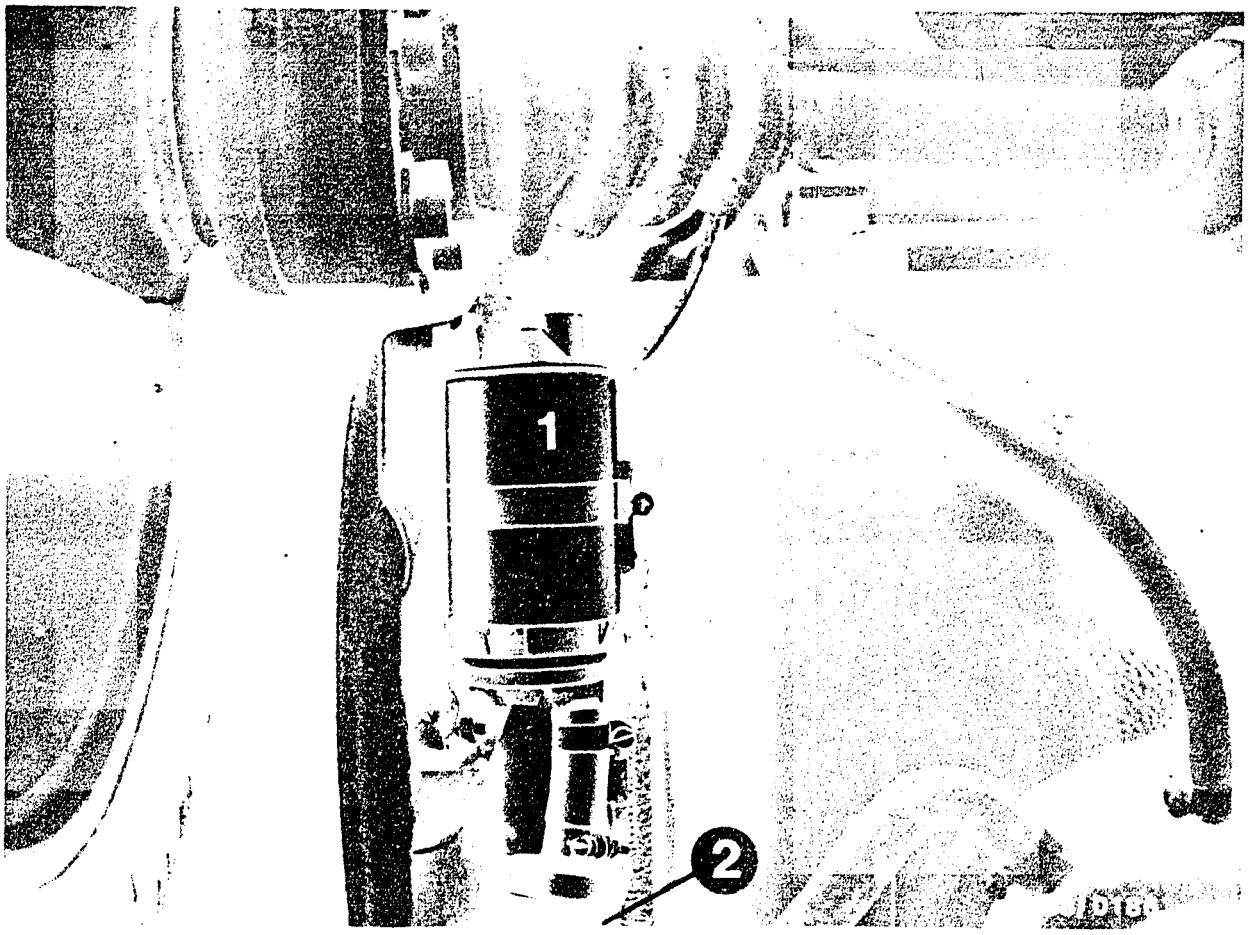
The thermo-time switch is located on the rear end face of the cylinder head in the coolant-distributor fitting. (Not visible from above, photographed here from the underside of the vehicle.)



1 = Electric pre-supply fuel pump
(non-Bosch product as from 1980 model)

2 = Electric fuel pump

3 = Fuel accumulator



Electric fuel pump (1) and fuel pre-filter (2, non-Bosch product) in the 1979 model.

7. Trouble-shooting chart (see also Coordinates B3/B4)

Customer complaint (fault symptom)

1. Engine does not start, or starts poorly, in cold condition
2. Engine does not start, or starts poorly, in warm condition*
3. Irregular idling during the warm-up phase (shakes)
4. Irregular idling with warm engine (shakes)
5. Engine does not draw gas, burbles
6. Engine misfires when operating on the road, high load
7. Insufficient power

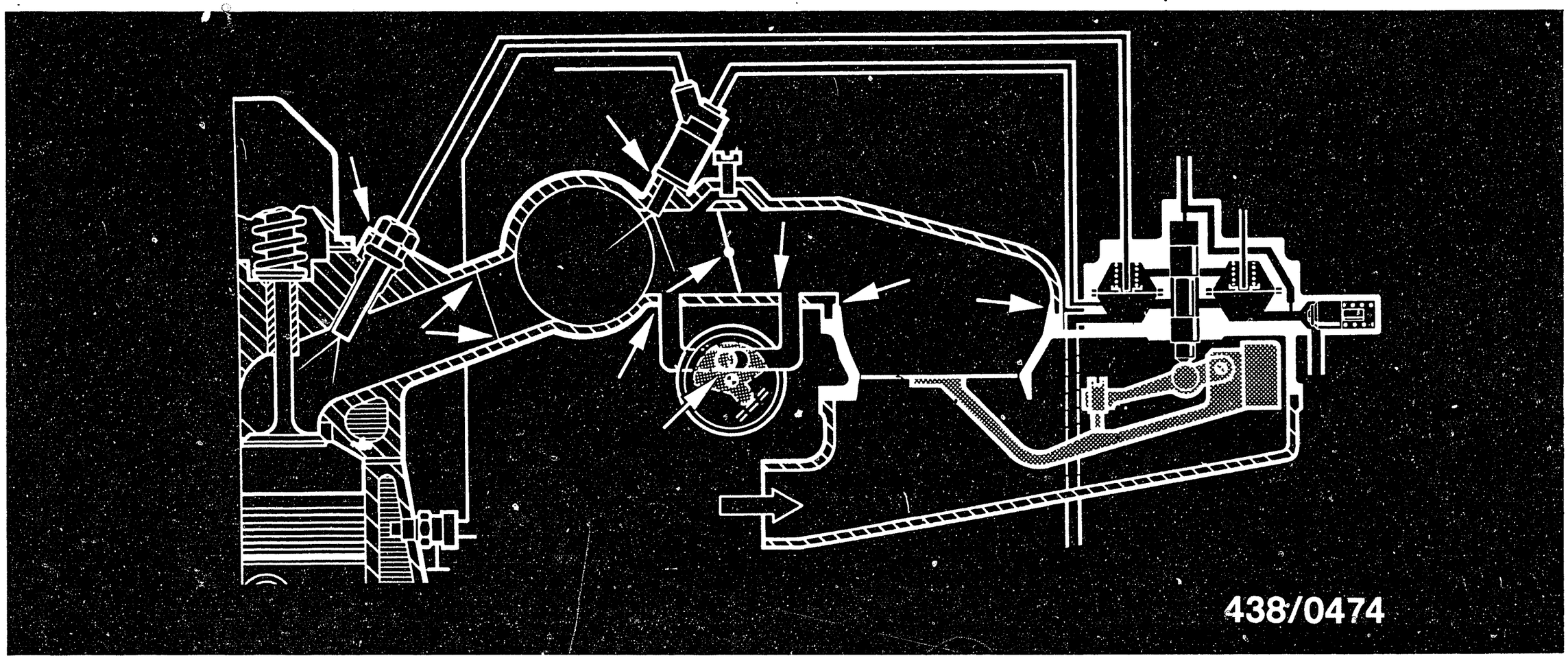
*Note :
If, in the case of Symptom 2, after checking and repairing all the fault causes listed below, the hot-start characteristic is still unsatisfactory this can be improved by fitting an impulse relay. The fitting of this relay is described in Coordinate L4.

1	2	3	4	5	6	7	Cause	Coordinates
	●	●	●	●		●	Vacuum system leaking	B 5
●	●		●	●	●	●	Air-flow sensor lever and/or control plunger not moving smoothly	B 7
	●						Position of the air-flow sensor plate incorrect (too low)	B 15
●		●					Auxiliary-air device does not open	B 19
							Auxiliary-air device does not close	B 19
●	●				●		Electric fuel pump not operating	B 21
●							Cold-start system defective	C 3
		●	●				Cold-start valve leaking	C 5
●		●					"Cold" control pressure outside tolerance	C 8
	●		●	●	●	●	"Warm" control pressure too high (after warm-up)	C 8
			●	●		●	"Warm" control pressure too low (after warm-up)	C 8
					●	●	Primary (system) pressure outside tolerance	C 20
	●						Overall fuel system leaking	D 5
●	●	●	●		●		Injection valves leaking, opening pressure too low	D 18
●	●	●	●			●	Unequal fuel delivery (imbalance of fuel delivery)	E 5
●	●	●	●	●			Basic idle adjustment incorrect	E 17
						●	Throttle plate does not open completely	-

Symptom

8. Engine runs on after being switched off ("diesels")
9. Fuel consumption too high
10. Flat spot during acceleration
11. CO concentration during idling too high
12. CO concentration during idling too low
13. Idle-speed cannot be adjusted (too high)
14. Engine starts but then immediately stops

8	9	10	11	12	13	14	Cause	Coordinates
		●		●			Vacuum system leaking	B5
●		●	●	●			Air-flow sensor lever and/or control plunger not moving smoothly	B7
●							Position of the air-flow sensor plate incorrect (too high)	B15
							Auxiliary-air device does not open	B19
					●		Auxiliary-air device does not close	B19
						●	Electric fuel pump not operating	B21
							Cold-start system defective	C3
●	●		●				Cold-start valve leaking	C5
							"Cold" control pressure outside tolerance	C8
		●				●	"Warm" control pressure too high (after warm-up)	C8
	●	●	●			●	"Warm" control pressure too low (after warm-up)	C8
		●				●	Primary (system) pressure outside tolerance	C20
							Overall fuel system leaking	D5
●							Injection valves leaking, opening pressure too low	D18
		●					Unequal fuel delivery (imbalance of fuel delivery)	E5
●	●	●	●	●			Basic idle adjustment incorrect	E17
							Throttle plate does not open completely	



Working steps

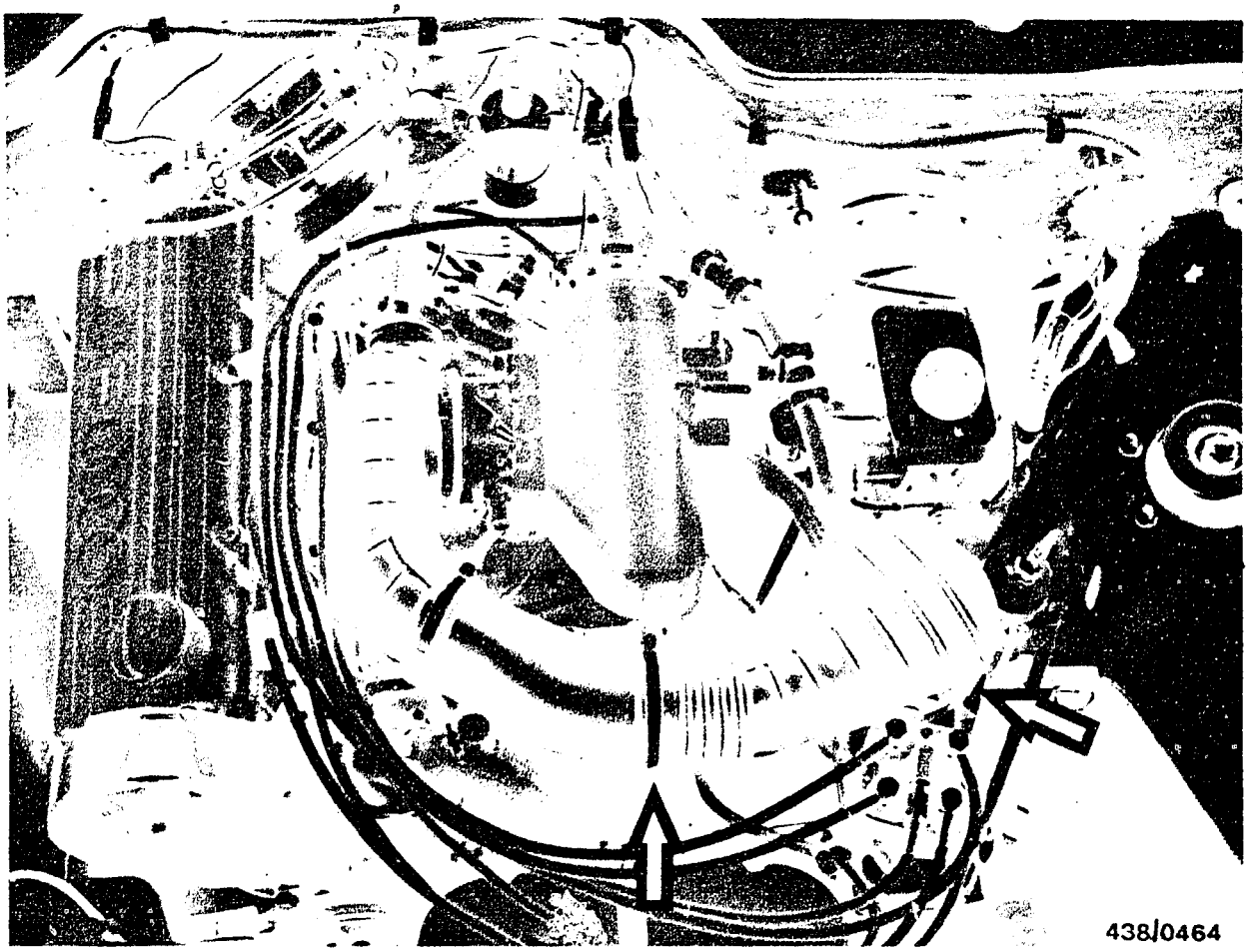
8. Check the air-intake system of the engine for leaks.

The arrows in the diagram show typical points where leaks can occur.
Check by performing a visual inspection or, in cases of doubt, as follows:

Disconnect the hose from the outlet of the auxiliary-air device and blow air through this hose into the intake system using a compressed-air gun. The throttle valve is to be fully open. Brush connection points with soapy water, or spray with leak detector (e.g. Güpoflex).

Under no circumstances may combustible liquids be used when testing for leaks.

The formation of bubbles or foam indicates a leak.
If a leak has been eliminated, it is necessary finally to adjust the idle speed with the engine at normal operating temperature:
Idle-speed adjustment is described on Coordinates E 18.



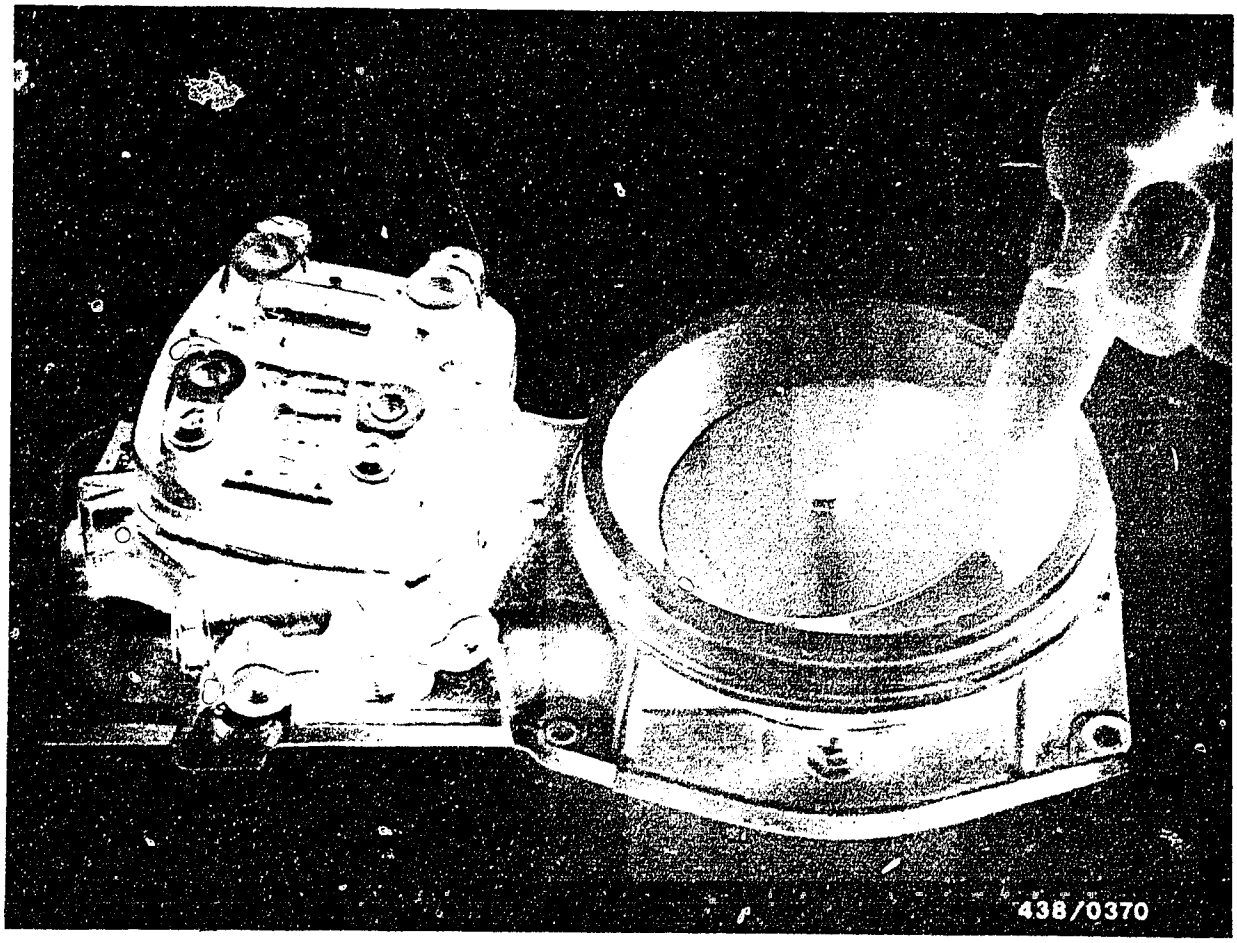
9. Check the control lever in the air-flow sensor and the control plunger in the fuel distributor for ease of movement.

9.1 Preparations

Engine temperature not below +20°C.

Remove the rubber hood from the air-flow sensor (release clamping bands) so that the air-flow sensor plate becomes accessible.

Switch on the electric fuel pump for approx. 10 seconds by bridging the safety circuit.
This results in application of the control pressure to the control plunger in the fuel distributor.



9.2 Check that the control lever moves freely

Raise the air-flow sensor plate by hand and release again.
The sensor plate snaps back into the zero position and bounces up about twice from the spring-loaded stop.
If the control lever does not move freely, first release all fastening screws holding the air-flow sensor to determine whether housing deformation is the cause of the problem.
If the problem is solved by loosening the fastening screws, the seal between the air-supply housing and air-flow sensor should be changed (Porsche parts).

Tighten the screws uniformly cross-wise to a torque of 9...10 Nm (0.9...1.0 kgfm).
If the housing is not deformed, then the air-flow sensor must be repaired or replaced.

To do this, remove the complete mixture-control unit as follows:

Thoroughly clean all fuel connections of the fuel distributor before opening.
Unscrew fastening screws of the air-flow sensor (6 hexagon-socket-head cap screws) and remove the mixture-control unit from the bracket.

Installation:

In order to prevent distortion, the gasket between the air-flow sensor and the bracket must be in proper condition. If necessary, replace. The fastening screws should be tightened uniformly cross-wise to a torque of 9...10 Nm (0.9...1.0 kgfm).
Always use new seal rings for the connection of the fuel lines.

9.3 Check that the control plunger moves freely

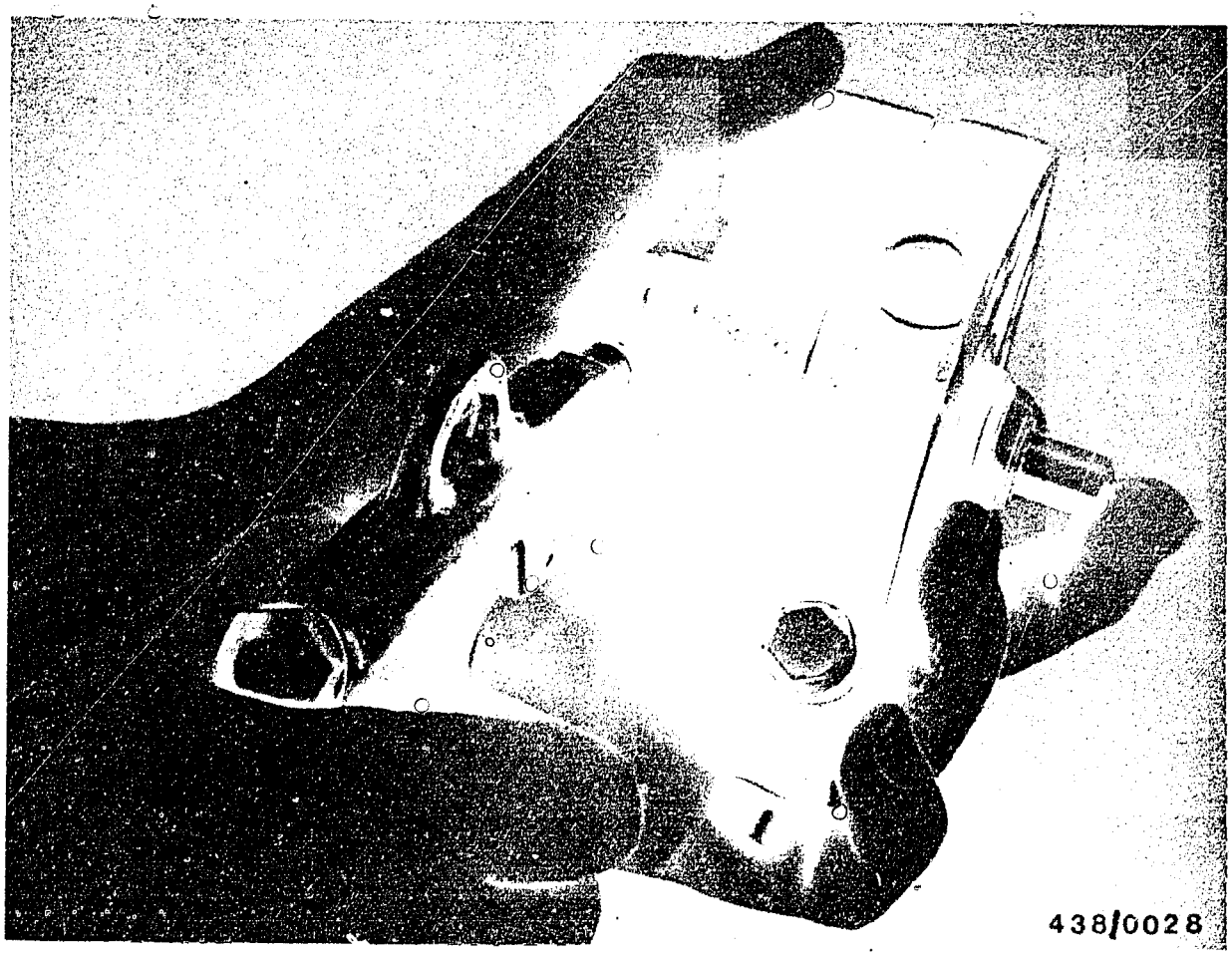
Raise the air-flow sensor plate by hand. The same resistance must be felt over the entire movement. Move the sensor plate rapidly back to a position just in front of the zero stop. The control plunger follows this rapid movement of the sensor plate only sluggishly, and therefore initially loses contact with the sensor plate lever. It must be possible, however, to feel the plunger make contact with this lever again. If this condition is fulfilled, the control plunger can be considered to move freely. If the control plunger does not move freely, remove the fuel distributor from the air-flow sensor.

Important!

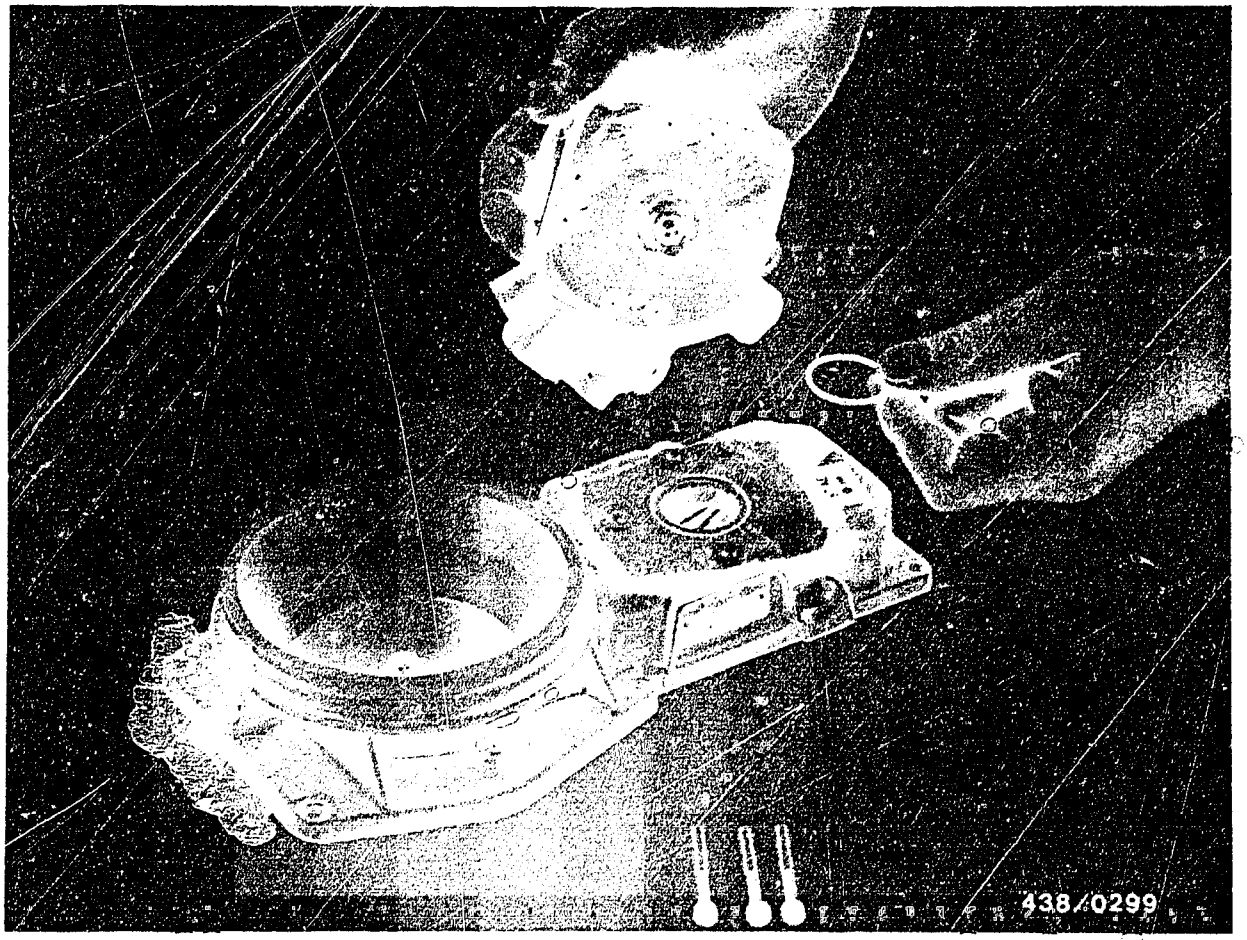
Note the following when installing fuel components and fuel lines:
Always ensure utmost cleanliness when loosening or tightening the fuel connections. No dirt must enter the fuel system.

When loosening or tightening the fuel connections, apply counter-force at the fixed hexagon of the component. Clean the fuel distributor thoroughly in the region of the fuel connections. Screw off all connections.

Screw out three fastening screws and remove the fuel distributor from the air-flow sensor.
The steel tubing must not be bent!

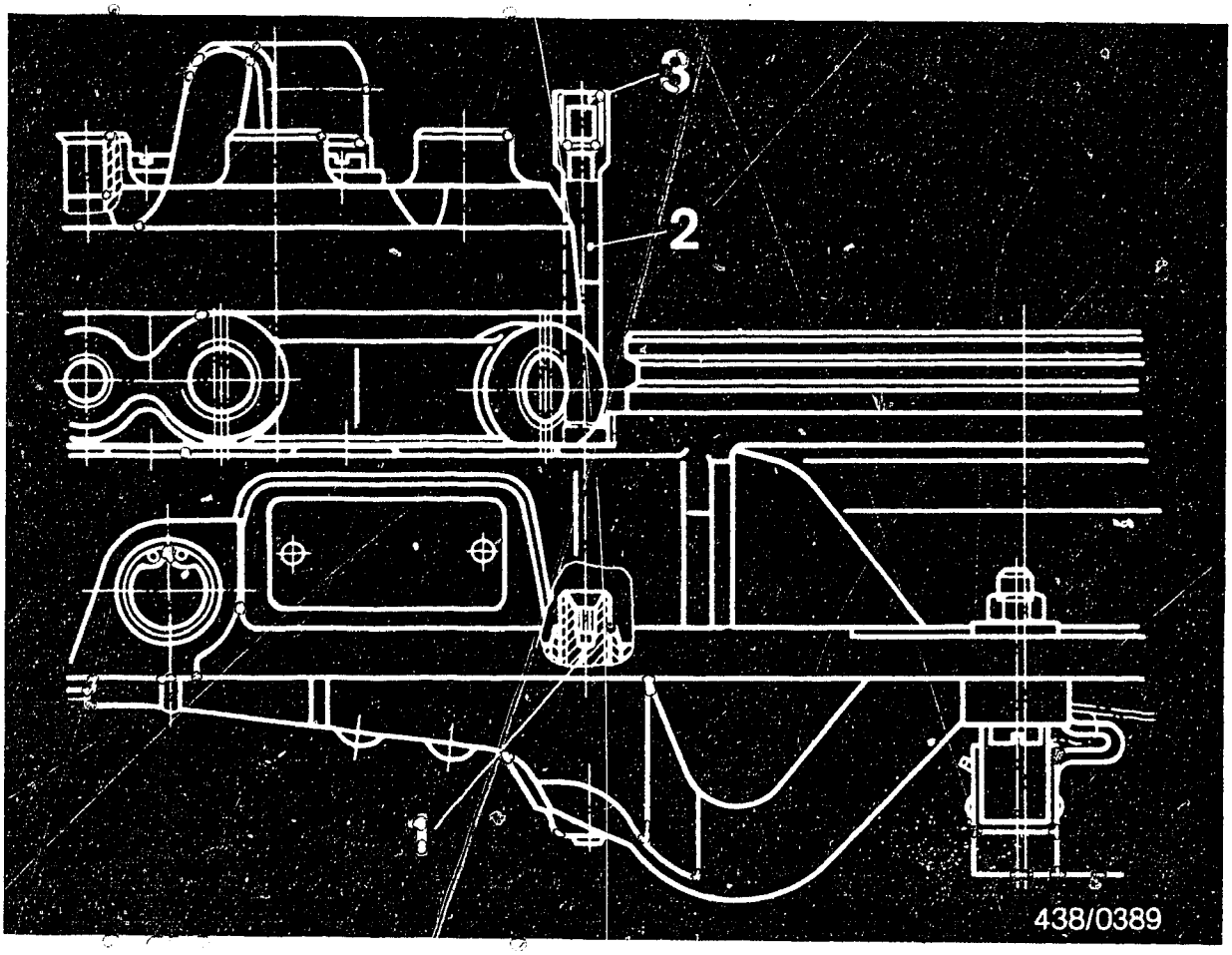


Remove the plunger. Under certain conditions, in order to do this it may be necessary to blow compressed air briefly against the plunger through the control-pressure connection hole. Hold the plunger with your hand while doing this. Clean the plunger thoroughly with benzine. If the plunger still does not move freely, replace the fuel distributor.



9.4 Fitting the fuel distributor

When fitting the fuel distributor, use a new seal ring between fuel distributor and air-flow sensor.
Observe the tightening torque 3.2...3.8 Nm (0.32... 0.38 kgfm) for the fastening screws precisely.
When connecting the fuel-injection tubing, use new seal rings.

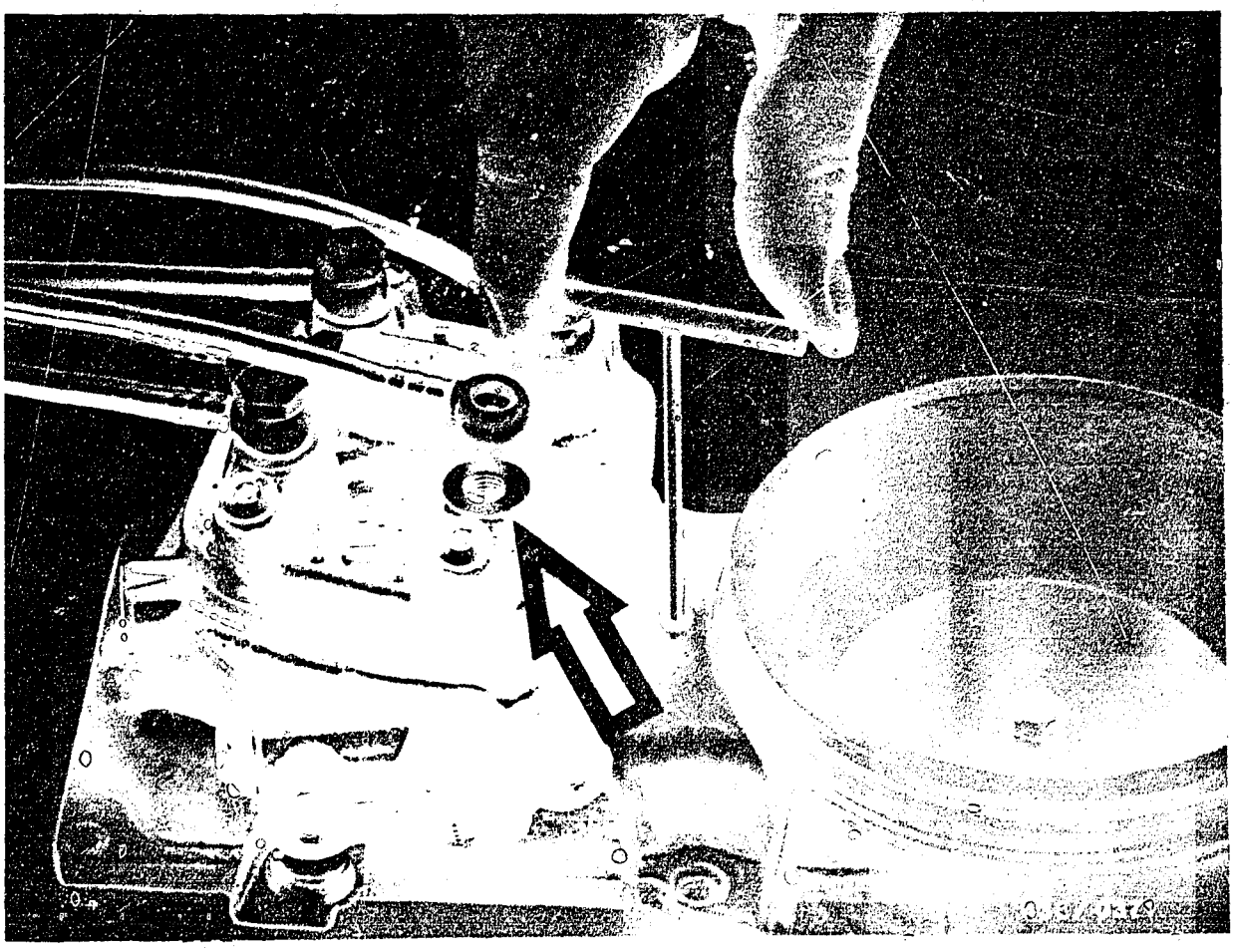


1 = Idle-mixture-adjusting screw
2 = Guide tube
3 = Lead seal

9.5 Matching the fuel distributor to the air-flow sensor for initial starting

Screw off one fuel-injection line from the fuel distributor.
Remove anti-tamper device (lead seal) of the idle-mixture-adjusting screw. Introduce adjusting wrench KDEP 1035 through the hole into the idle-mixture adjusting screw.

Bridge the electrical safety circuit so that the electric fuel pump operates.

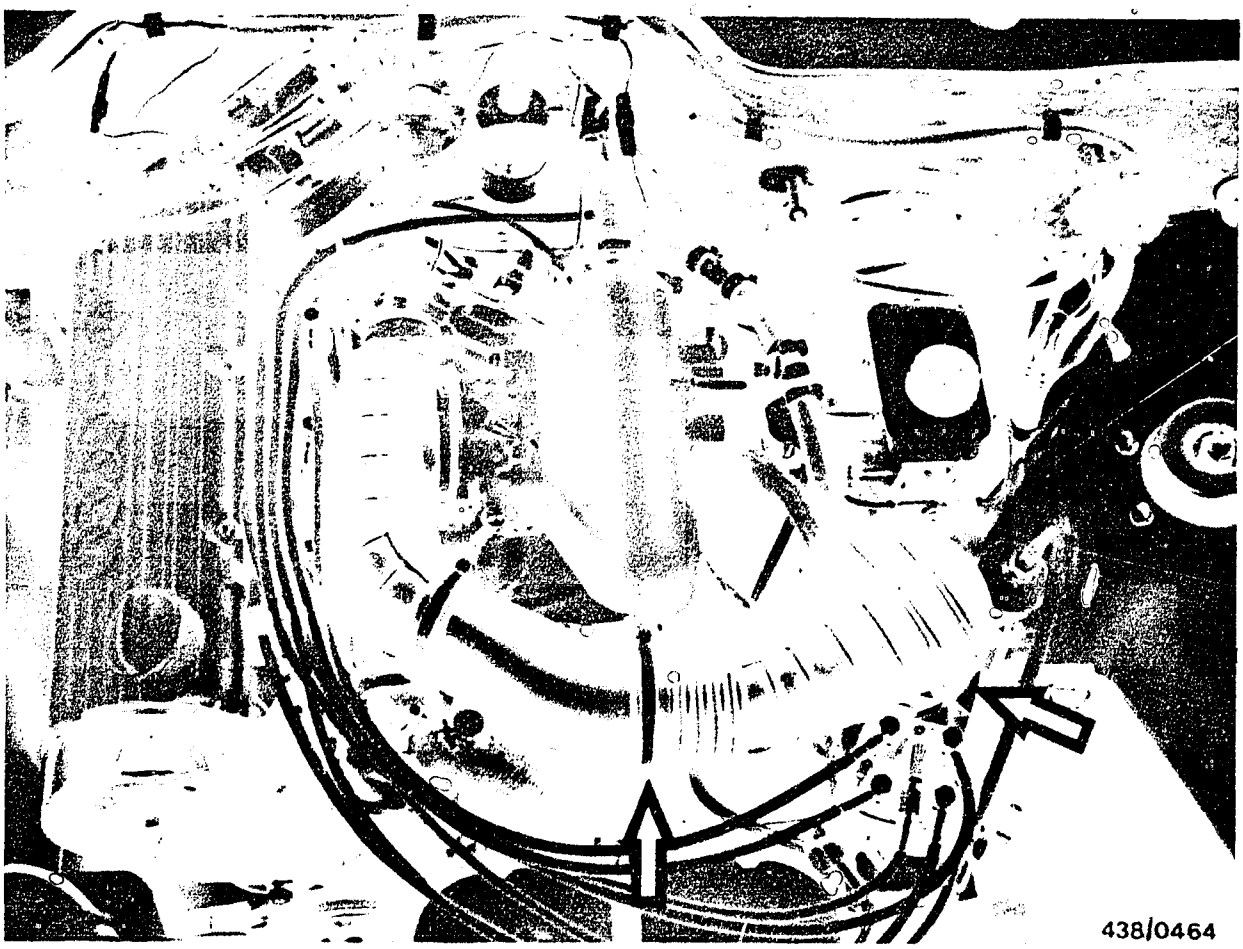


Screw in the idle-mixture-adjusting screw slowly and without exerting any great pressure on the adjusting wrench until fuel is just delivered from the open outlet (arrow) of the fuel distributor. Then turn back the adjusting screw by 1/2 turn.

Re-connect the fuel-injection line to the fuel distributor, start the engine and warm up.

The final matching of air-flow sensor and fuel distributor is carried out by adjusting the idle speed with the engine at normal operating temperature.

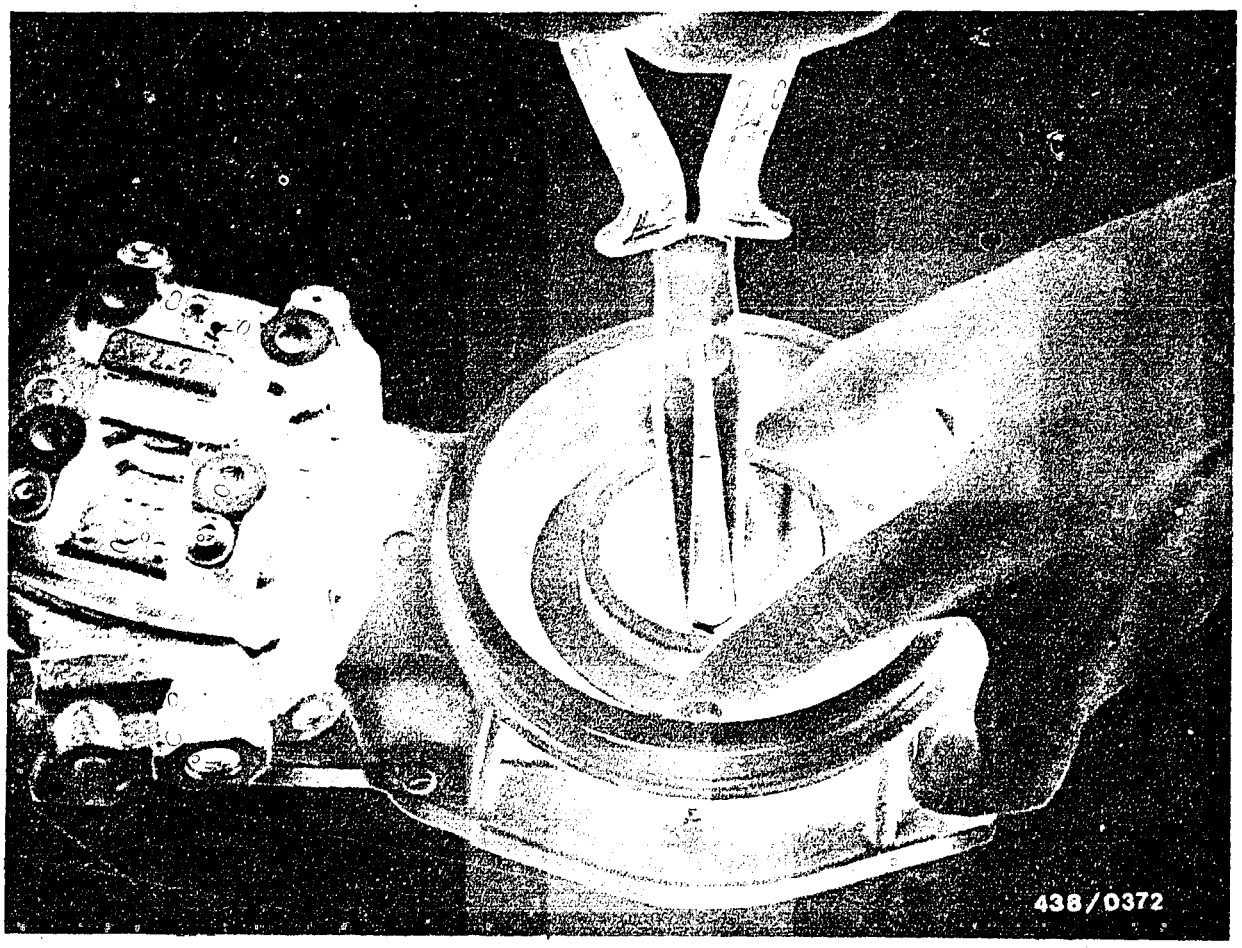
Idle-speed adjustment is described on Coordinates E 18.



10. Checking and adjusting the position of the air-flow sensor plate

10.1 Preparations

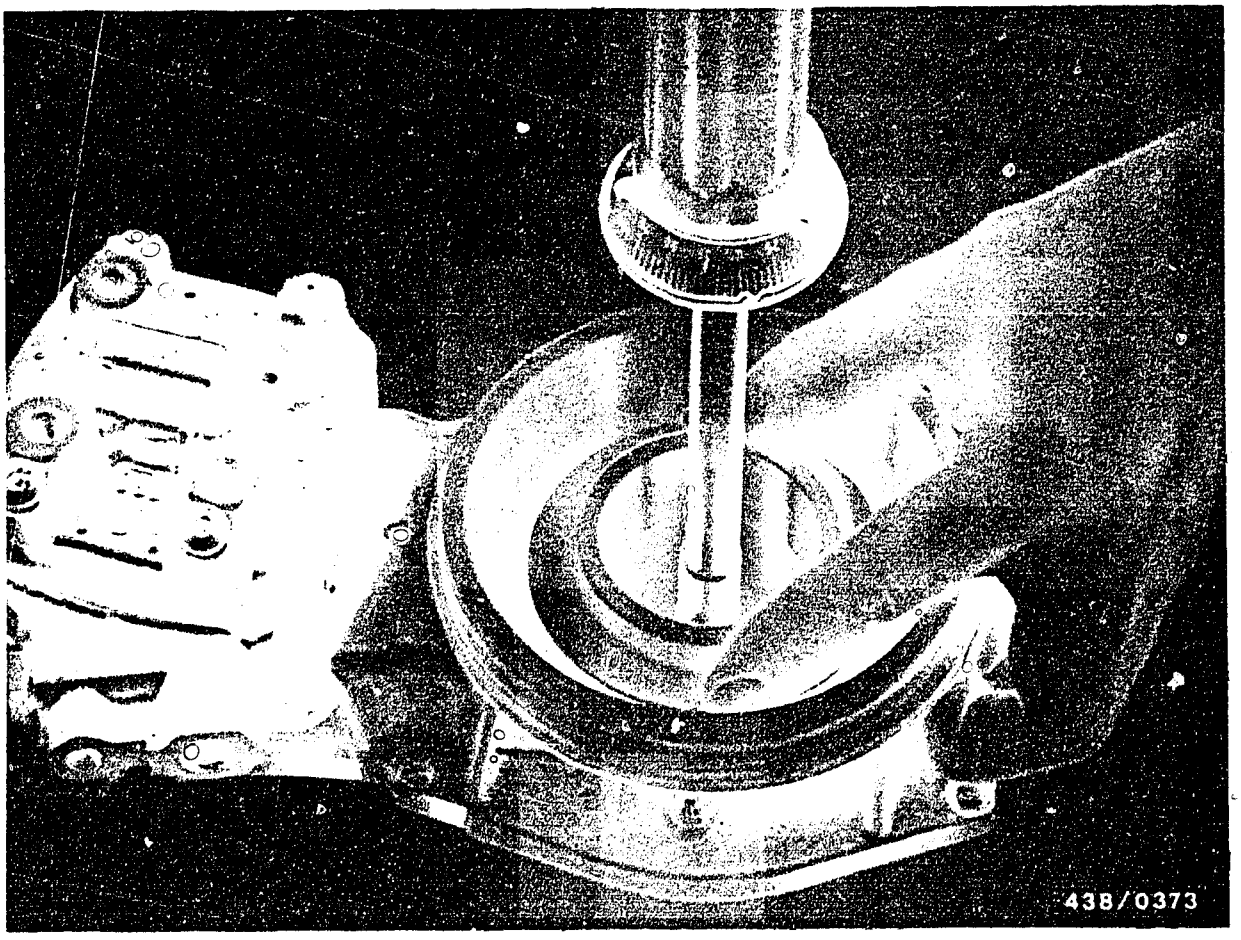
Engine temperature is not important.
Remove the rubber hood from the air-flow sensor (release clamping band), so that the air-flow sensor plate becomes accessible.



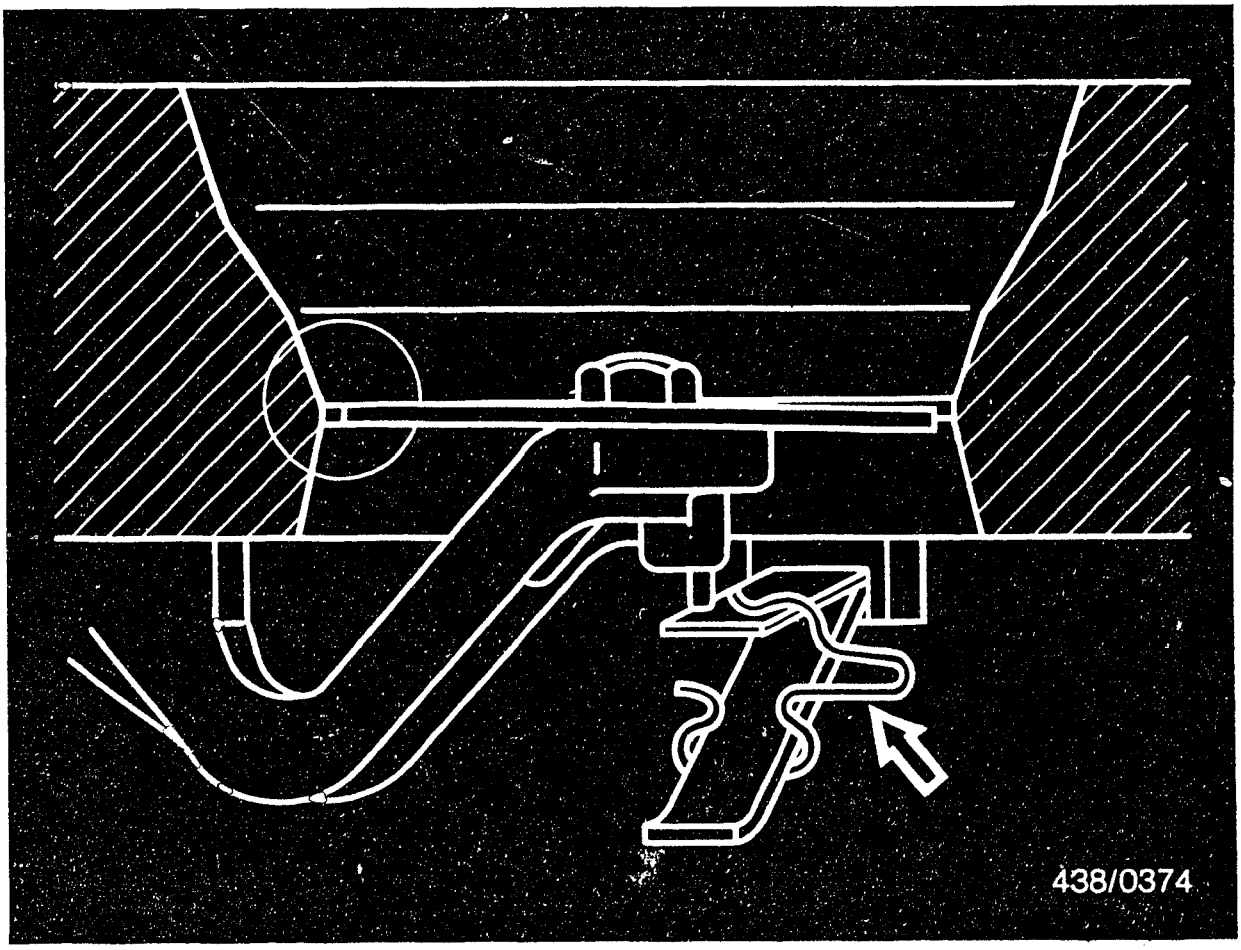
10.2 Centering the air-flow sensor plate:

Check that the sensor plate is flat (not bent) and that it can move through the narrowest part of the air funnel without touching the funnel. If necessary, center it using a positioning ring KDEP 1040/10 (dia. 80 mm) as follows:

Loosen the sensor plate fastening screw. Insert the positioning ring while holding the fastening screw with pliers so that the sensor plate does not deflect downwards.



With the positioning ring in place, tighten the fastening screw with a torque of 5.0...5.5 Nm, loosen again and tighten again with the same torque.
It must no longer be possible to turn the air-flow sensor plate by hand.

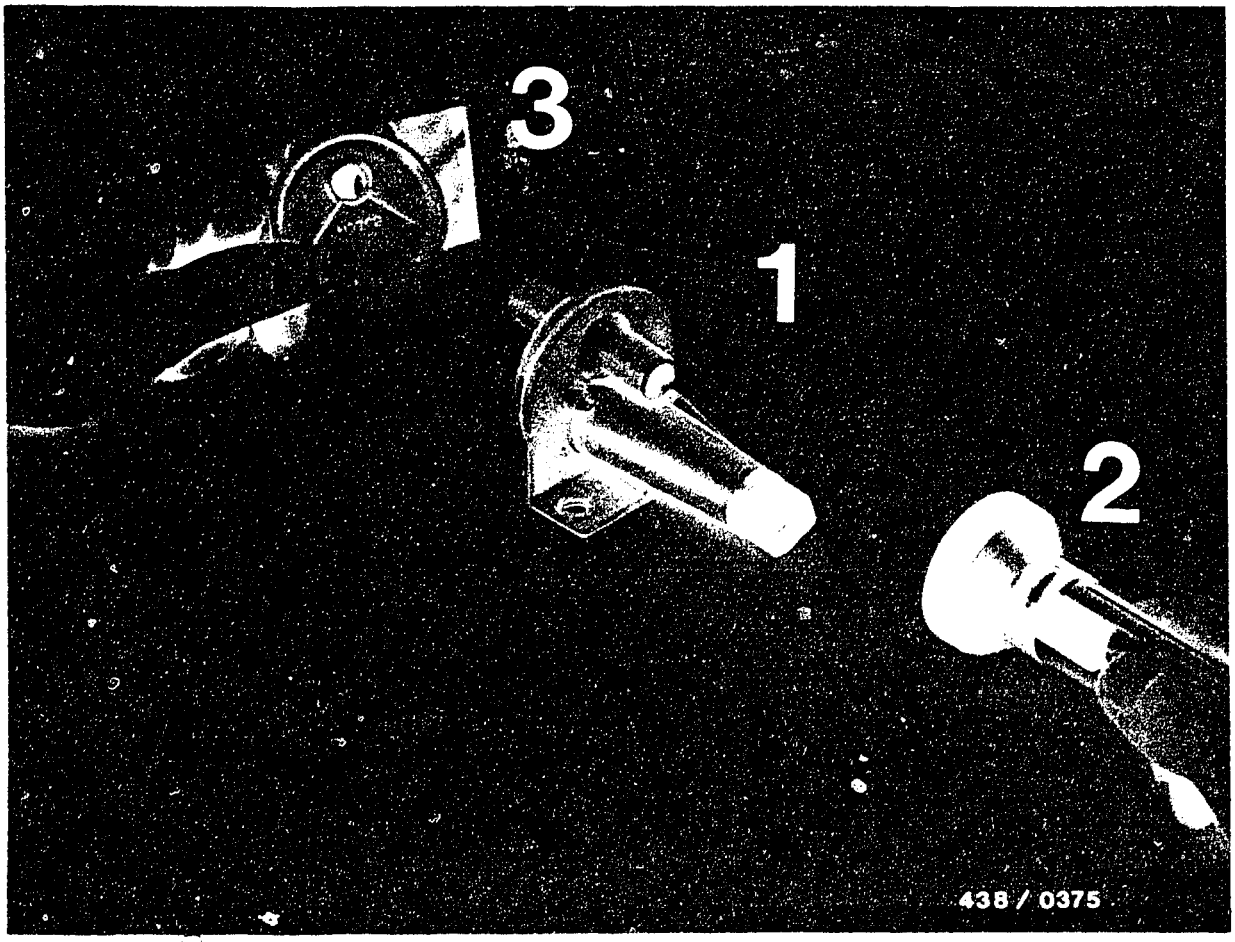


10.3 Checking and adjusting the zero position of the sensor plate (rest position):

Switch on the electric fuel pump for approx. 10 seconds by bridging the safety circuit.
This results in application of the control pressure to the control plunger in the fuel distributor.

The upper edge of the sensor plate must be flush with the beginning of the cone in the position shown in the picture. A lower position of up to maximum 0.5 mm is permissible, however the air-flow sensor plate must not project at any point on its circumference outside the cylindrical part of the air funnel.

If necessary, the position of the leaf-spring limit-stop can be corrected by adjusting the shaped spring (arrow).



1 = Auxiliary-air device
2 = Flashlight
3 = Mirror

11. Checking the operation of the auxiliary-air device

The engine must be cold.
Disconnect the electric cable plugs from the auxiliary-air device and warm-up regulator.
Disconnect both air hoses from the auxiliary-air device.
Since the two hose fittings on the auxiliary-air device are located exactly opposite each other, a visual check can now be made to see if the blocking plate is partially open.
It will be easier to look through the auxiliary-air device with the aid of a flashlight and a mirror, as shown in the illustration.
If an opening is not visible with the engine cold, replace the auxiliary-air device.

Fit the electric cable plug on the auxiliary-air device. By bridging the electrical safety circuit, supply power to the auxiliary-air device.

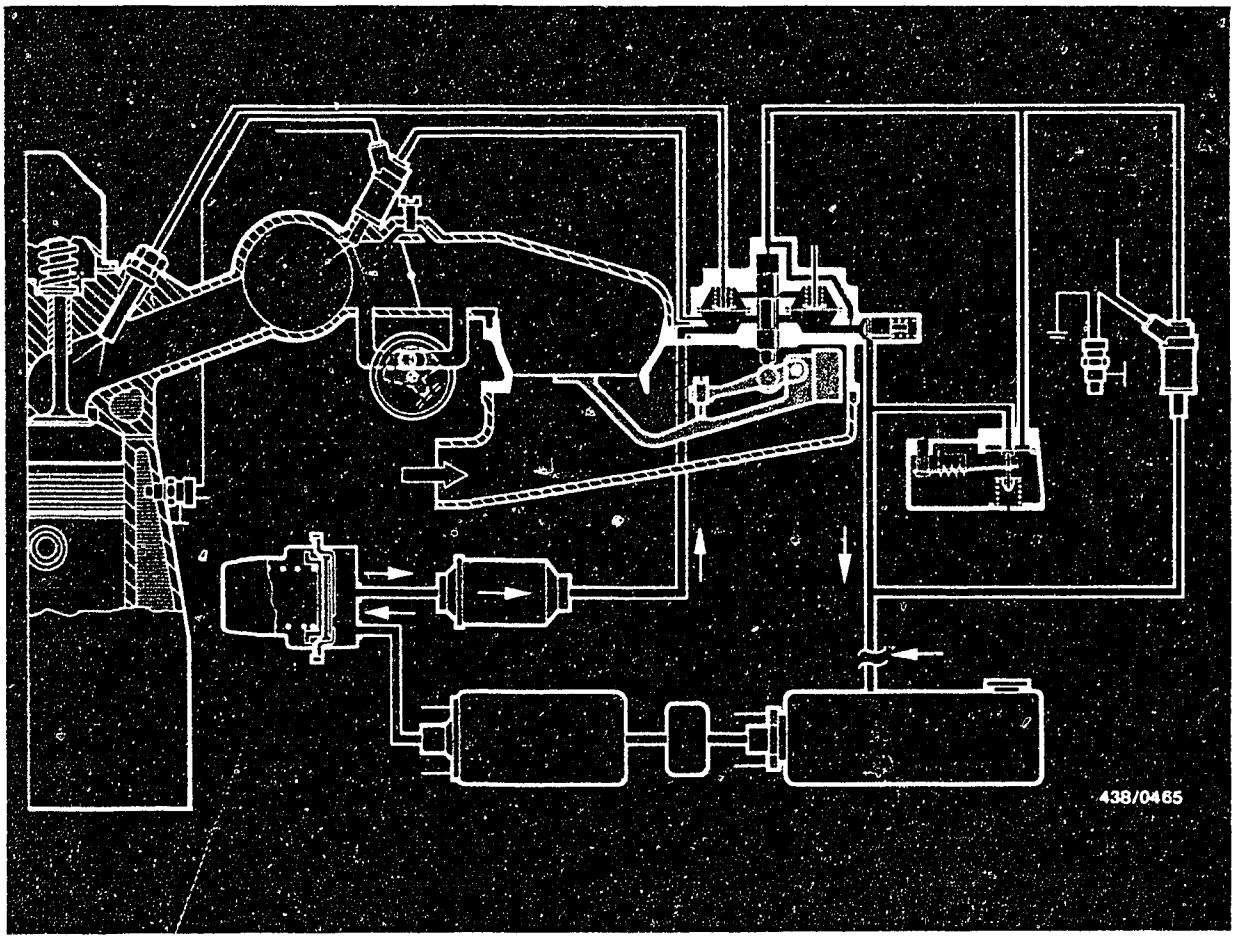
After a maximum of 10 minutes, the opening in the auxiliary-air device must be completely closed by the blocking plate.

If the blocking plate does not close, check the power supply (open circuit, voltage drop).
The minimum voltage at the connector is 11.5 V with the engine switched off.

If these points are OK, check the heating coil in the auxiliary-air device with an ohmmeter for an open circuit.

Replace a defective auxiliary-air device.

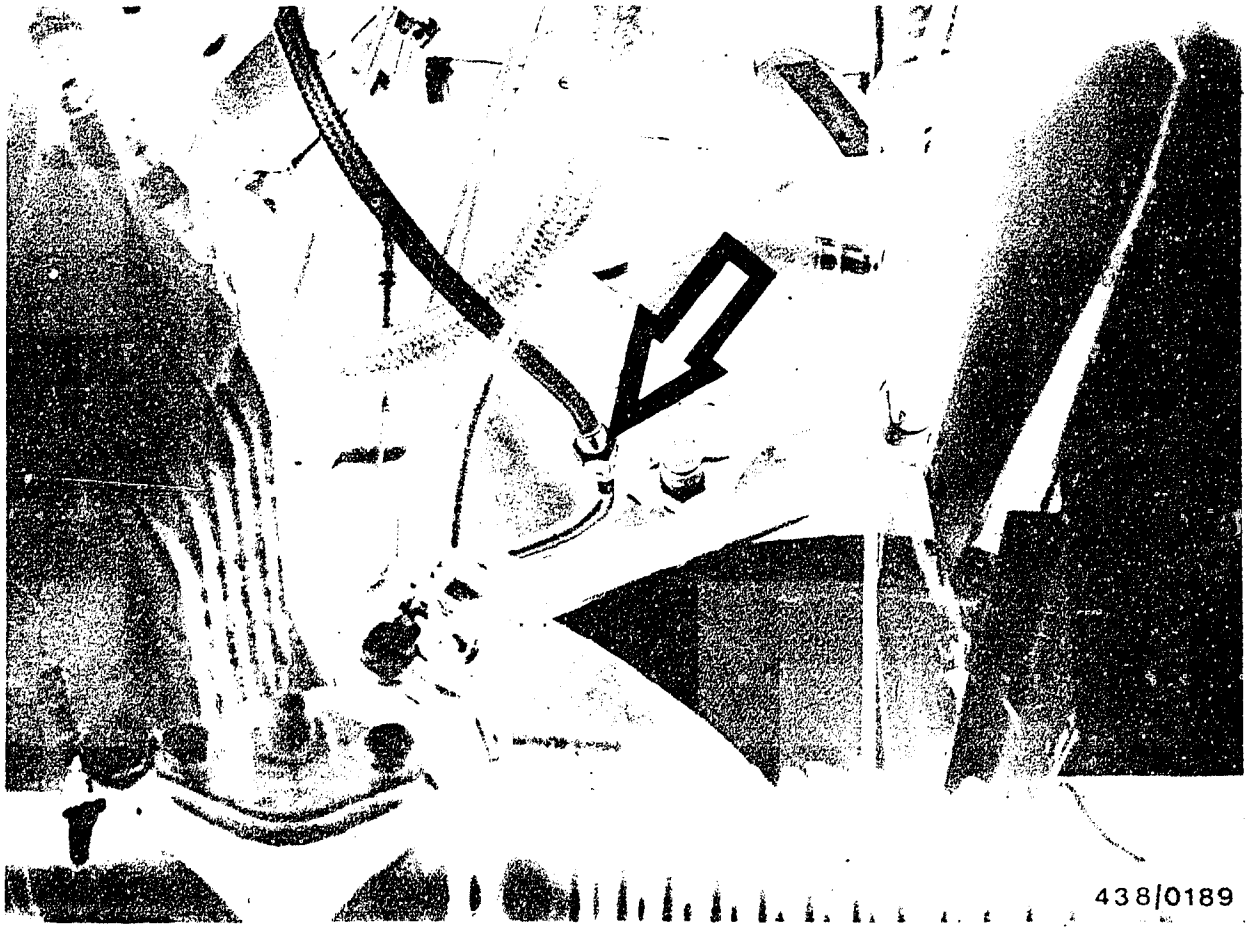
The idle-speed adjustment is described on Coordinates E 18.



12. Checking the operation of the electric fuel pump

12.1 Requirement

Conclusive information on the operation of the electric fuel pump can only be given by a measurement of fuel delivery under pressure, i.e. under primary (system) pressure. This measurement must therefore be made at the return line leading to the fuel tank (arrow), downstream of the point where the individual return lines are joined.



12.2 Test point

A suitable test point is the screw connection in the return line on the left-hand side (as viewed from behind the vehicle) above the front axle (arrow).

For measuring, undo the screw connection and hold the hose in a graduate.

Use a commercially available graduate of approx. 1.5 litres capacity.

As the test is performed with the engine switched off, the electric fuel pump must be switched on by bridging the electrical safety circuit.

12.3 Test specification:

Fuel delivery: At least 750 cm^3/30 s

12.4 Possible causes of insufficient fuel delivery:

- Power supply to the electric fuel pump defective.

- Voltage drop at the connection of the electric fuel pump.
Minimum voltage with pump operating is 11.5 V.

- Fuel filter, as well as fuel pre-filter in the case of the 1979 model, very dirty.

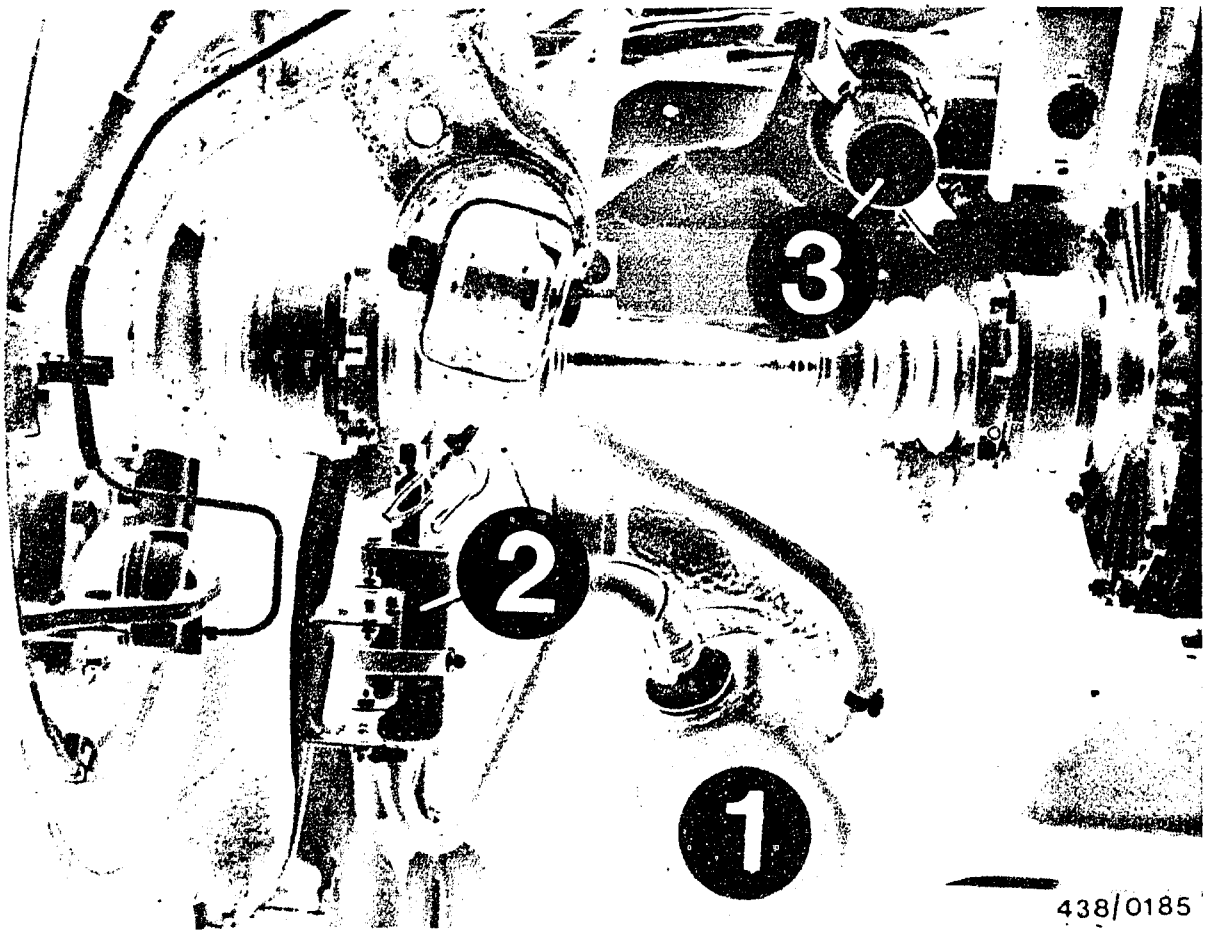
- Pre-supply pump (1980 model) does not function.

If necessary, carry out noise test with the main electric fuel pump electrically disconnected.
If you are not certain remove hose from the intake fitting of the main electric fuel pump and hold in graduate. Compare quantity of fuel escaping.
More fuel must be delivered when the pre-supply pump is switched on than when it is switched off.

If these points are OK, the fault lies in the electric fuel pump itself.
Replace the electric fuel pump.

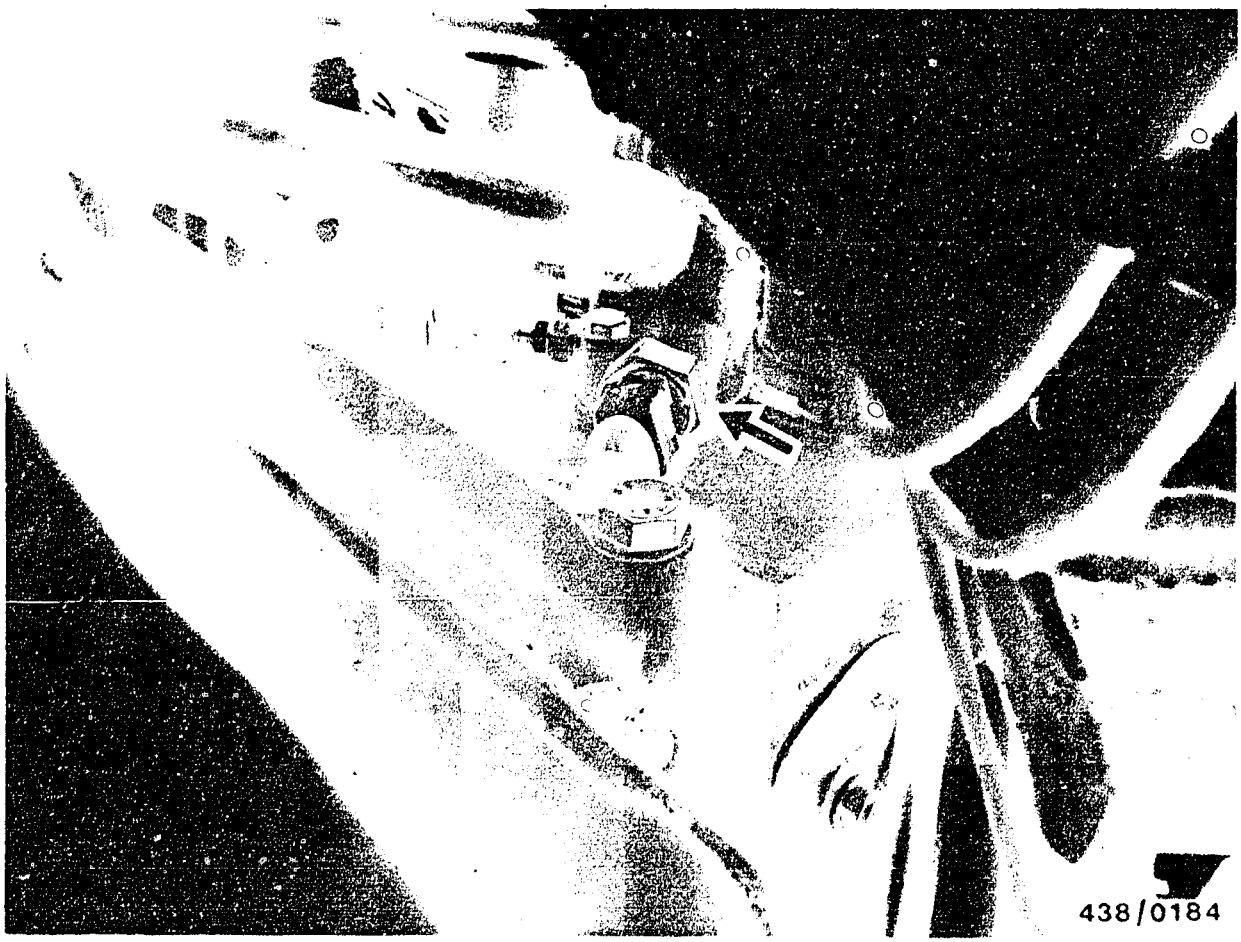
12.2 Removing and installing the fuel-supply components:

Before removing the prefilter or electric fuel pump (1979 model) pinch off the intake hose (from the fuel tank) using, for example, Matra hose clamper W 157.



12.6 Pre-supply pump on the 1980 model:

Before removing the pre-supply pump (1) drain the fuel tank. Since there is no drain plug on the tank, the fuel must be emptied through the filler neck using a suitable suction pump.
Remove the electrical connections on the pre-supply pump. Pinch off the hose line to the electric fuel pump (2) (e.g. using hose clamper W 157 from Matra Co.). Loosen the hose clamp on the pre-supply pump and remove the hose. Unscrew the pre-supply pump out of the fuel tank suction bowl.
Caution: Collect any escaping fuel.
Install the new pump with a new seal.

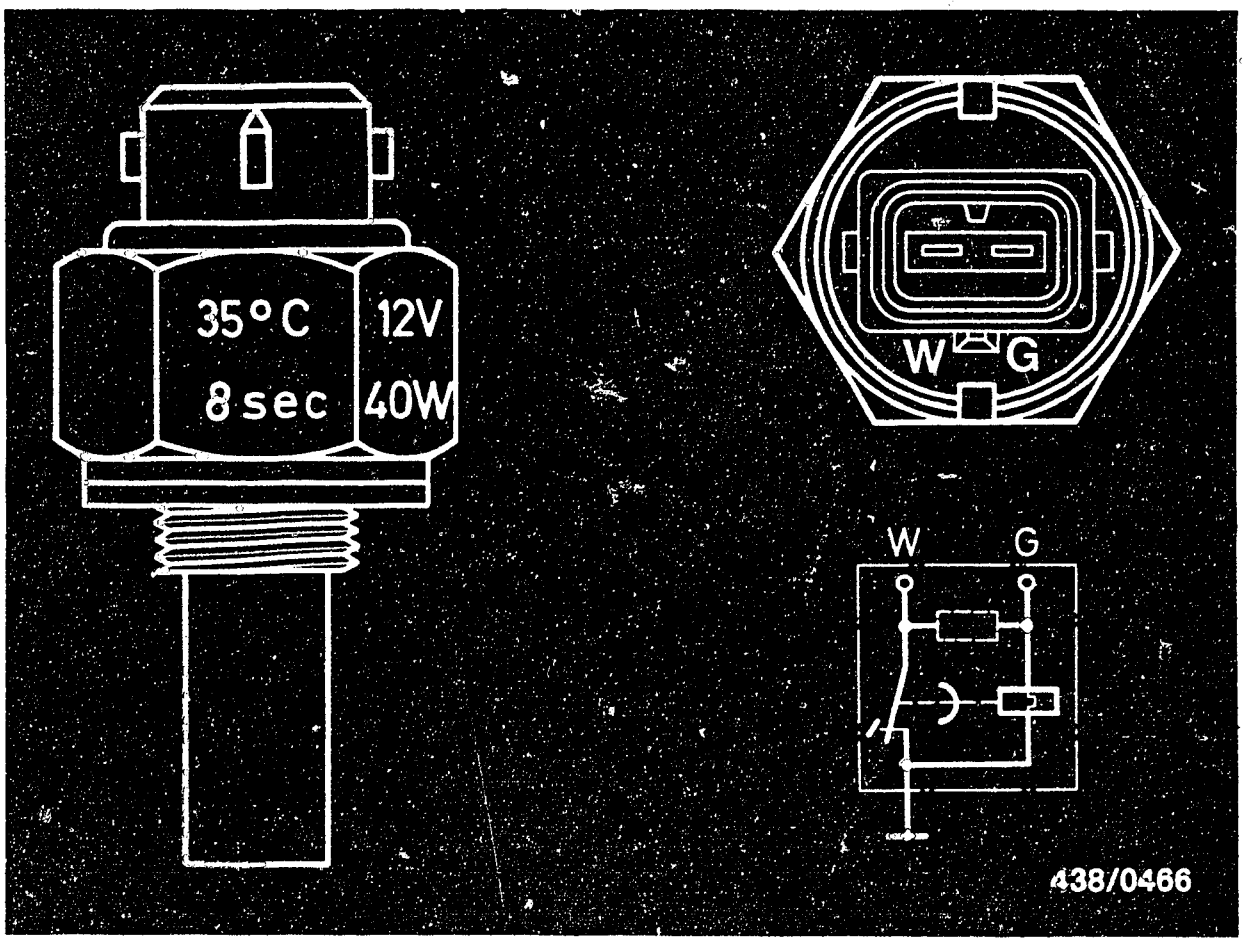


13. Testing the cold-starting system (thermo-time switch, start valve)

13.1 Thermo-time switch:

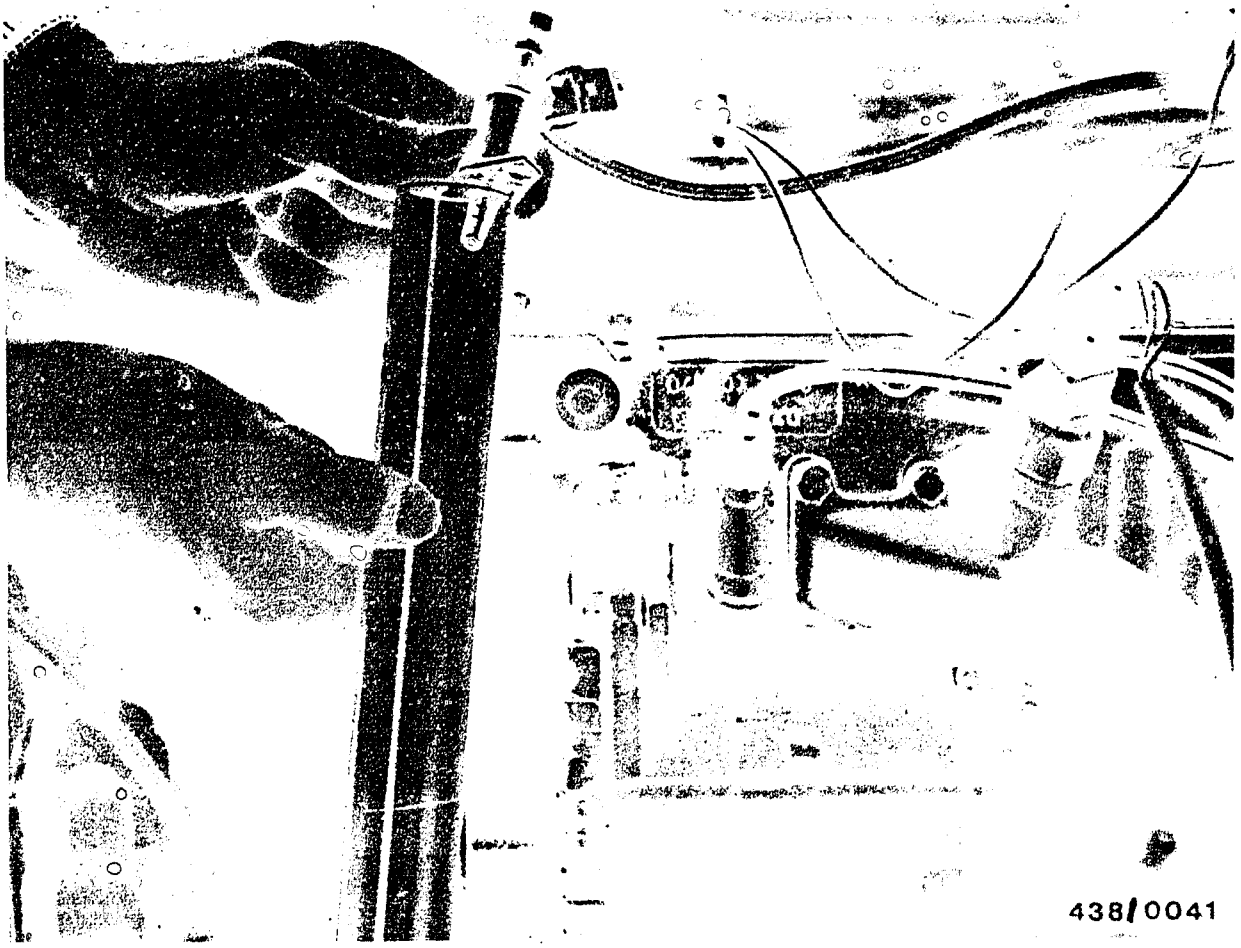
Remove the thermo-time switch for testing.
It is located on the rear end face of the cylinder head in the coolant-distributor fitting (arrow, not visible from above, photograph here from the underside of the vehicle).
It is best removed from below.

Caution: Remove, if possible, only with the engine cold since a slight amount of coolant will escape. The quantity of coolant escaping would be much greater if the engine were hot.



The thermo-time switch used in the Porsche 924 model has a switching temperature of 35°C and a switching time at -20°C of 8 seconds. Both values are stamped into the hexagonal section of the thermo-time switch.
The removed thermo-time switch is tested using the ohmmeter in accordance with the specifications given below. The temperatures for the thermo-time switch can easily be obtained with water.

At a temperature below °C	above °C	Resistance measurement (Ω) between Term. "G" and "ground" (housing)	Term. "W" and "ground" (housing)	Term. "G" and "W"
+30		25...40	0	25...40
	+40	50...80	100...160	50...80



13.2 Start valve

Remove the start valve. The fuel line remains connected. Pull off the plug and connect the start valve directly to ground and to terminal 15 (e.g. at the ignition coil) using connecting cable KDJE 7450/70.

Important note: During this test, do not let the connecting cable touch B+. Danger of fire due to sparking! Hold the start valve in a suitable container (e.g. the graduate).

Switch on the electric fuel pump by bridging the safety circuit.

Switch on the ignition (max. 30 seconds). The start valve must now open and spray fuel.

Switch off the ignition, remove the connector cable and dry the nozzle of the start valve. No droplets of fuel must drip from the nozzle of the start valve during the next minute.

Then switch the electric fuel pump off again.
Replace the start valve if it does not open or if it leaks.

Idle-speed adjustment is described on Coordinates E 18.

14. Checking the control pressures

14.1 Preliminary remarks:

The control pressures tested in the following are in each case governed by the warm-up regulator.
If the test results are incorrect, however, this may also be due to faults which have nothing to do with the warm-up regulator.

These possible faults are:

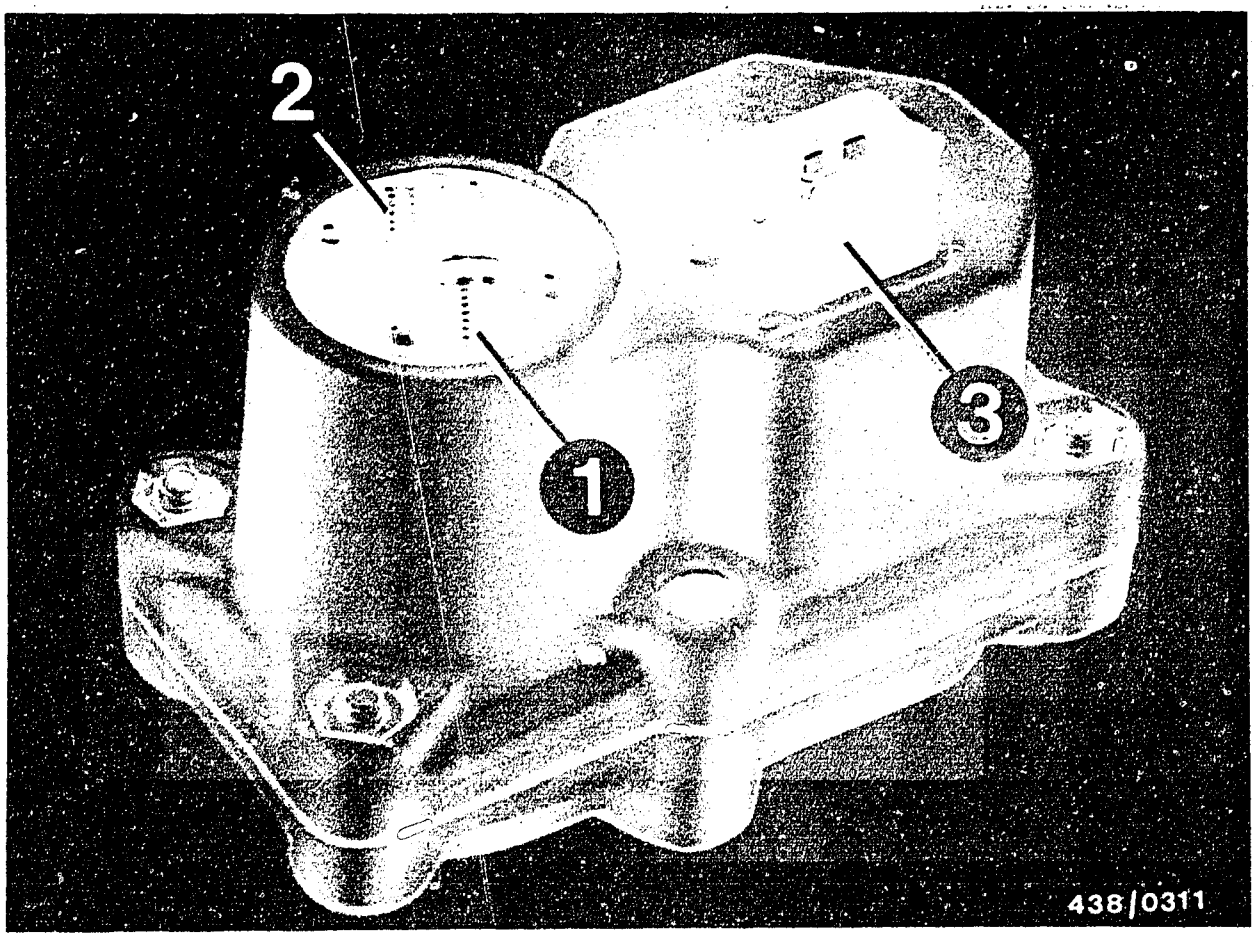
- No or too low a voltage at the electric connector.

- Fuel return from the warm-up regulator blocked or constricted.

- Too high a fuel delivery for the control-pressure circuit.

The testing of this control-pressure delivery is described as an additional test step at the beginning of the control pressure tests (Coordinates C 10).

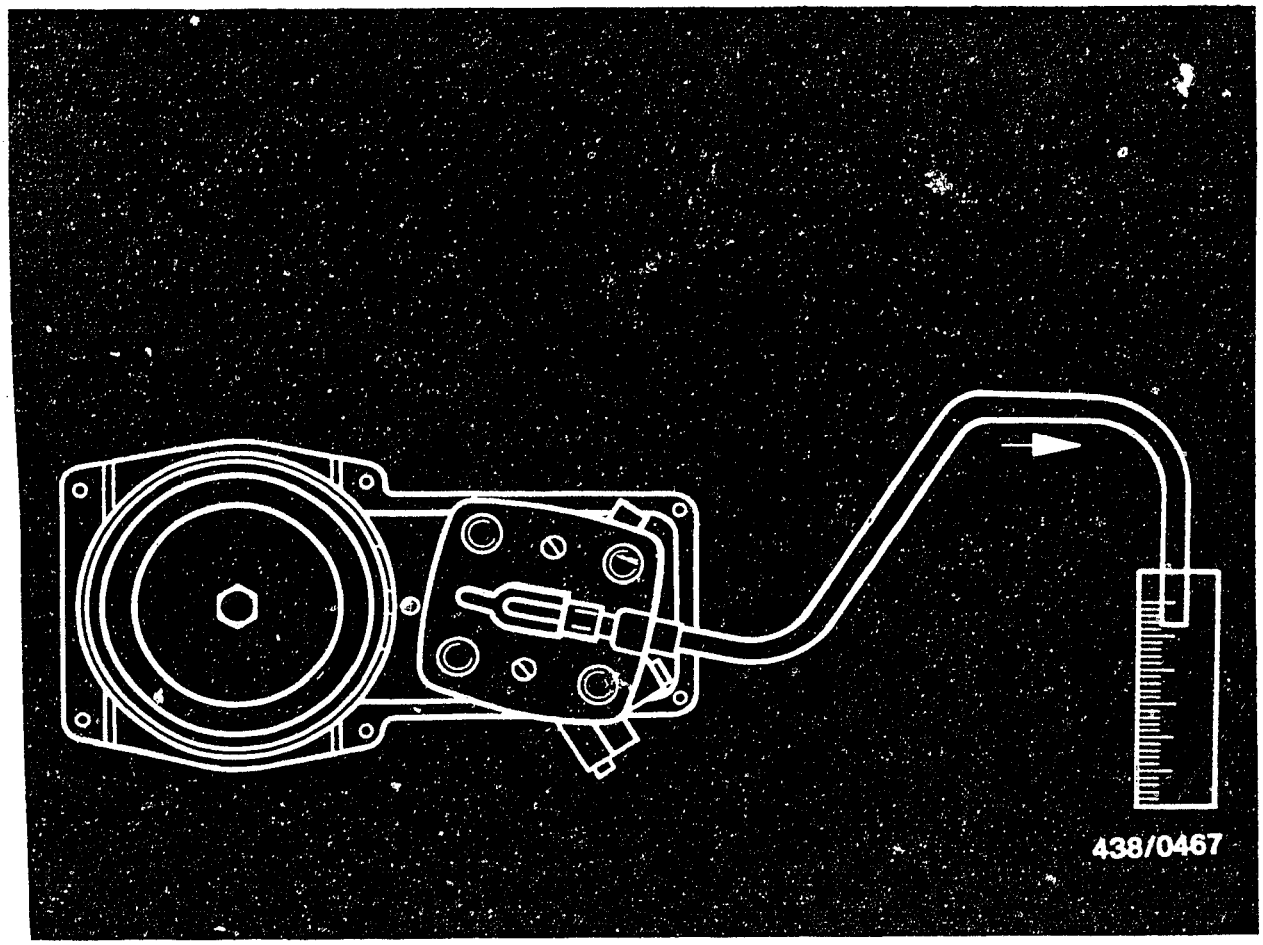
Reference is made to the other possible causes of trouble in the respective test step.



1 = Intake port (M 10 x 1)
2 = Return port (M 8 x 1)
3 = Electrical connection

14.2 Warm-up regulator for the Porsche 924 model

The warm-up regulator corresponds to the standard design, i.e. apart from control pressure "cold" and "warm" no other functions (such as full-load and altitude compensation) are performed.



14.3 Checking the fuel delivery for the control-pressure circuit:

Before testing, make sure that the electric fuel pump is operating properly (Coordinates B 21).

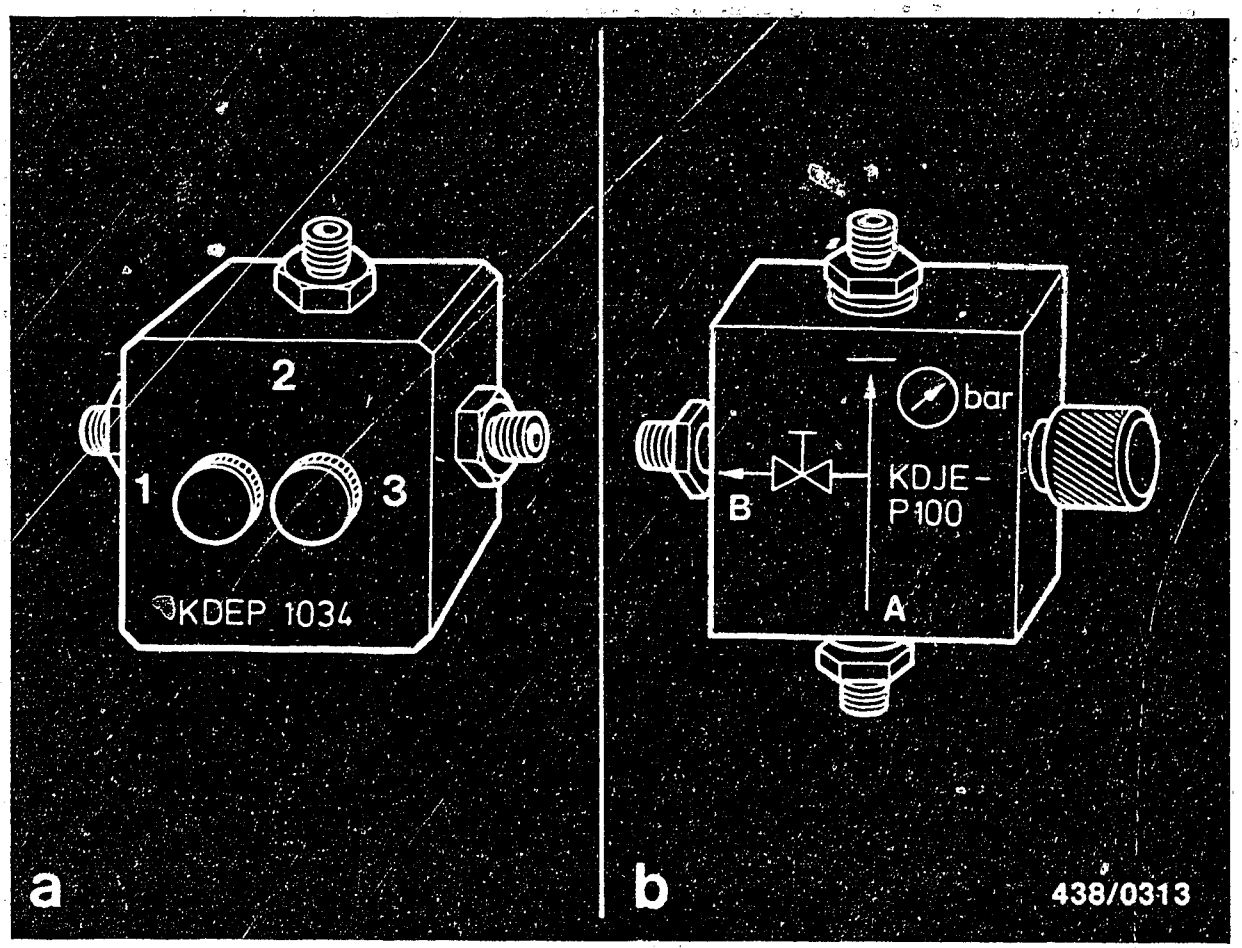
Unscrew the control-pressure line (to the warm-up regulator) from the fuel distributor.

Connect one of the two hose lines of pressure tester KDJE-P 100 (previously KDEP 1034) to the control-pressure connection port of the fuel distributor (M 12 x 1.5 thread) and hold in graduate (capacity approx. 0.5 l).

Switch on the electric fuel pump for 1 minute by bridging the safety circuit. Measure delivery.

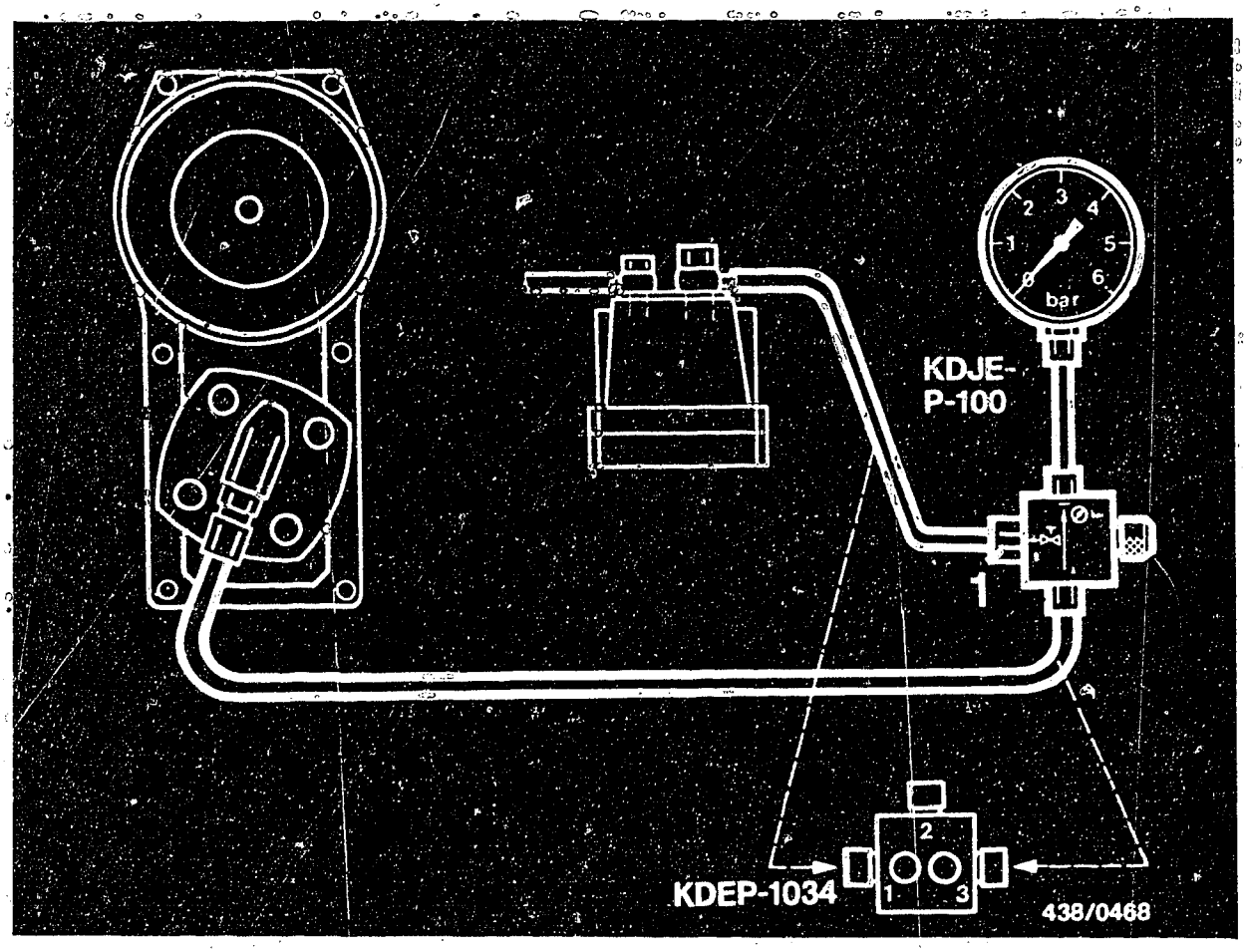
Test specification: 160...240 cm^3/min.

If the measured value is outside tolerance, the fault is in the fuel distributor. Replace the fuel distributor.



14.4 Mounting the pressure tester KDJE-P100 (formerly KDEP 1034):

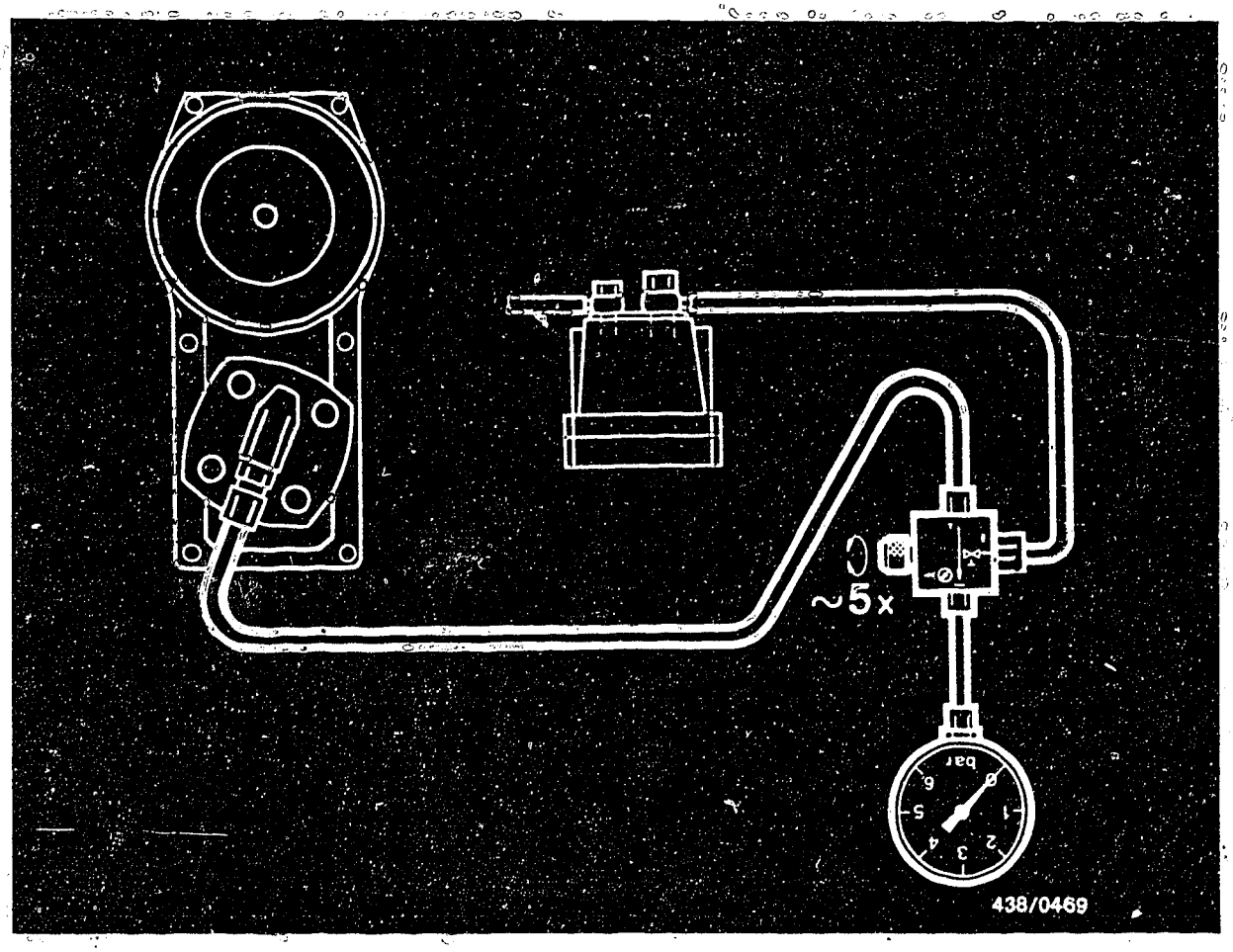
The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional control valve are identified by symbols:
A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)
Caution: When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



The pressure tester directional-control valve is connected into the control-pressure line leading from the fuel distributor to the warm-up regulator:

Unscrew the control-pressure line (to warm-up regulator) from the fuel distributor and connect it to port 1 or B of the directional-control valve.

Connect port 3 or A of the directional-control valve to the control-pressure connection port of the fuel distributor via the hose line pertaining to the pressure tester.



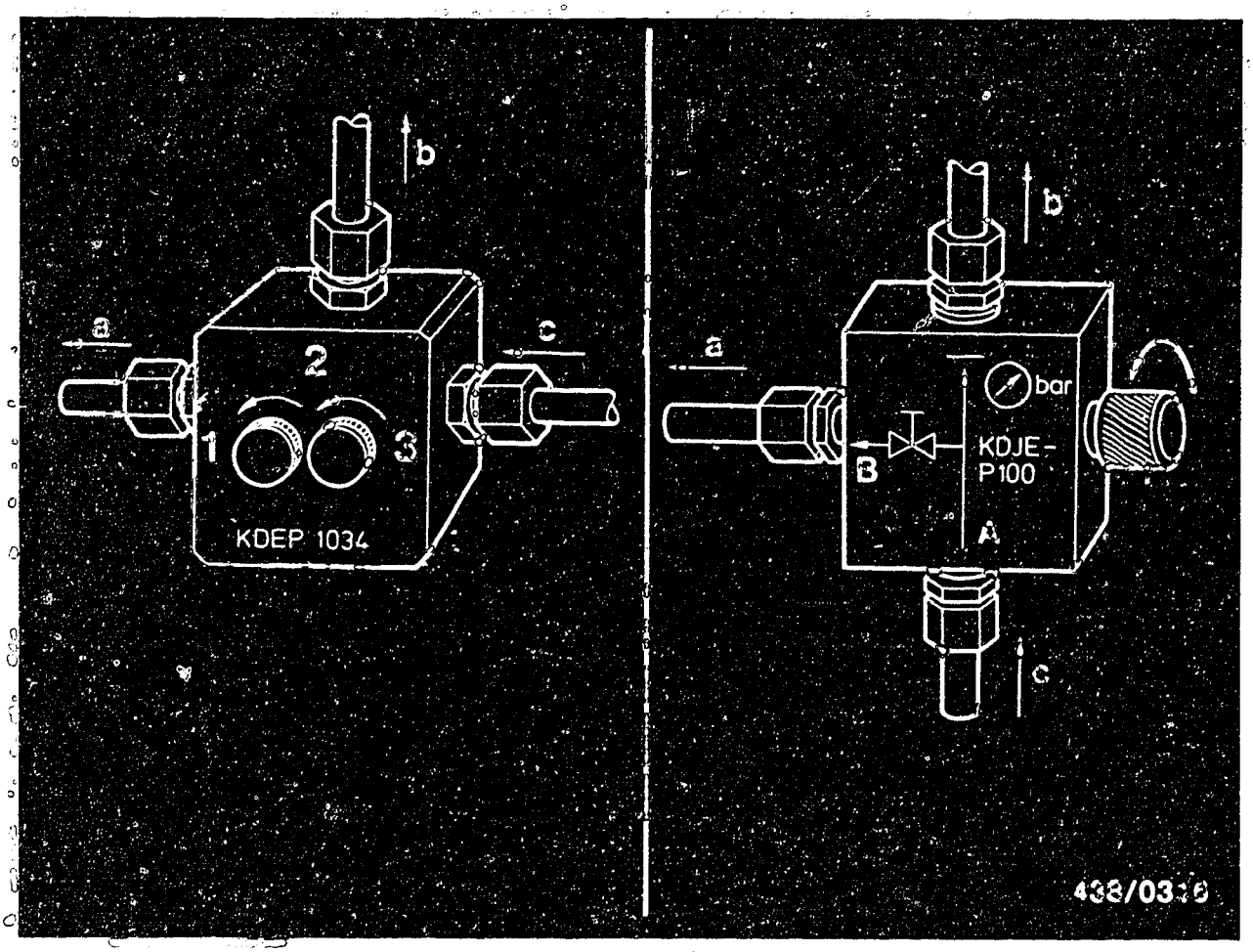
14.5 Bleeding the pressure tester:

Disconnect the electric plug from the warm-up regulator and the auxiliary-air device.

Let the pressure gauge hang down (hose fully extended). Switch on the electric fuel pump by bridging the electrical safety circuit.

Open and close the valve screw(s) of the directional-control valve (or valve screw 1 in the case of KDEP 1034) in a 10-second rhythm about 5 times. Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).

Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

14.6 Testing the "cold" control pressure

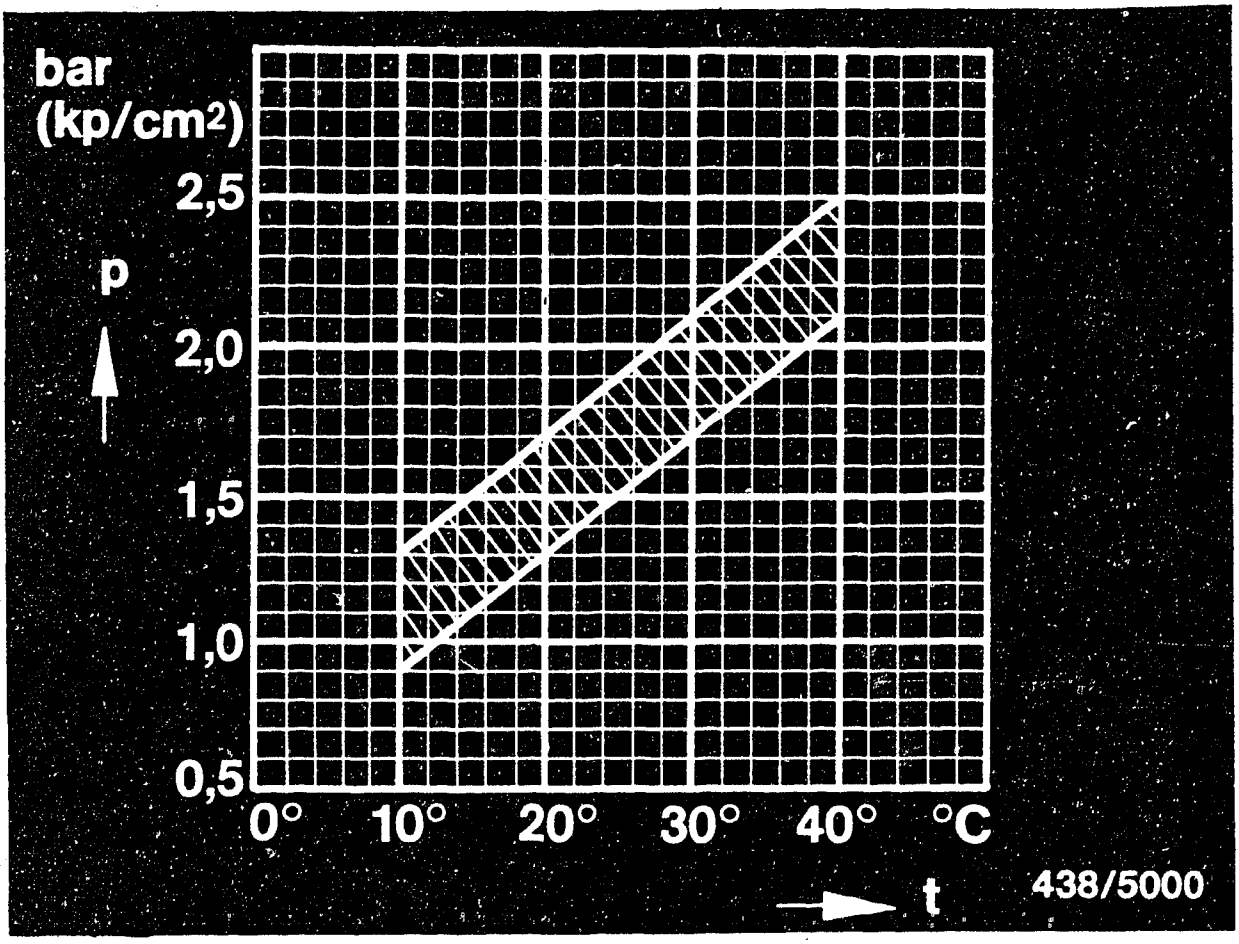
The test is performed with the engine switched off. The engine must be cold. For this purpose, the engine should have been switched off for several hours, preferably overnight.

Pull off the plug from the warm-up regulator.

Open the valve screw of the directional-control valve (both screws in the case of KDEP 1034).

Switch on the electric fuel pump by bridging the electrical safety circuit.

The pressure gauge now indicates the "cold" control pressure.



p = Control pressure (gauge pressure)
t = Ambient temperature

Warm-up regulator Part No.: 0 438 140 011

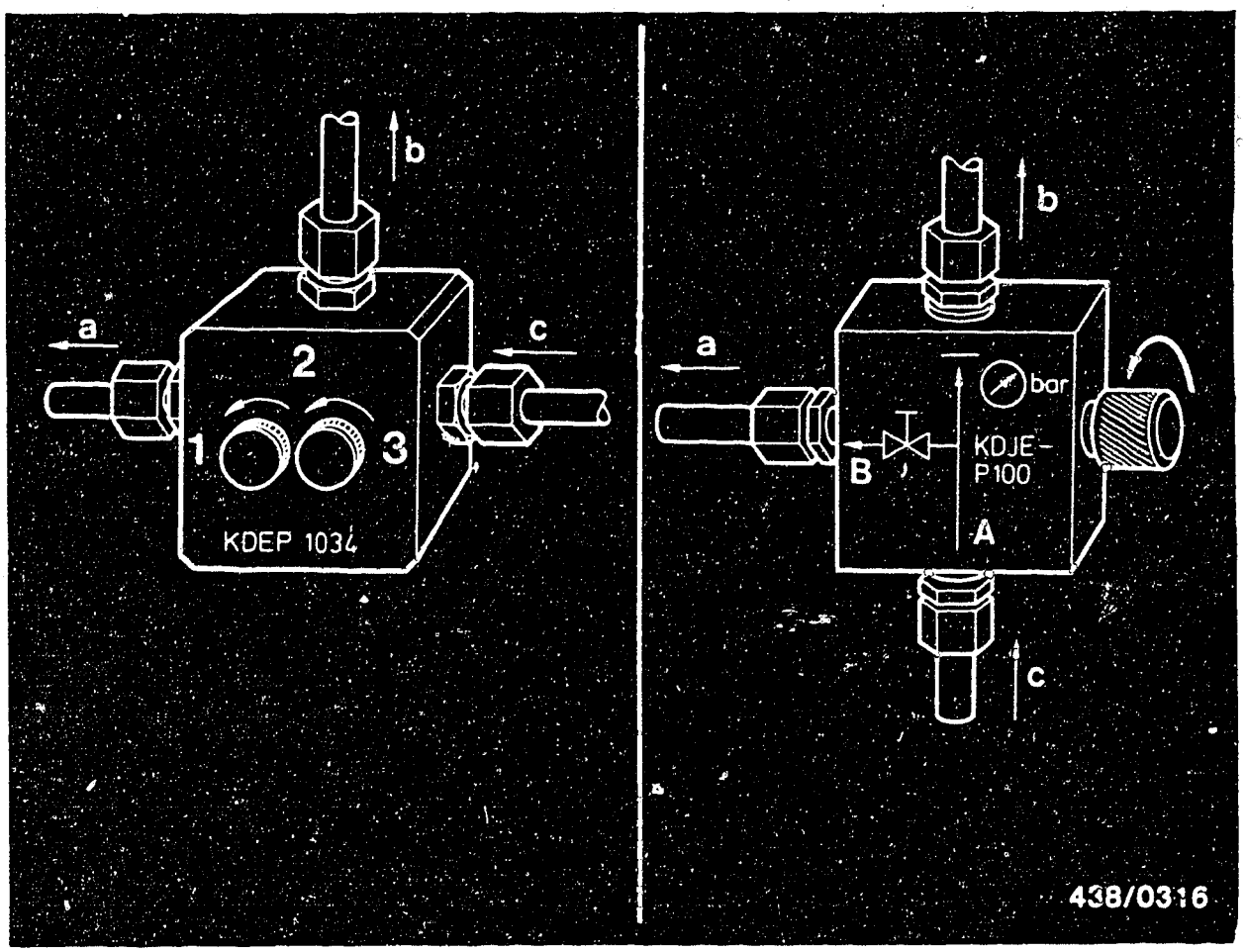
Calculate the nominal control pressure in accordance with the ambient temperatures in the graph.
Example: Ambient temperature = 15°C
Nominal control pressure = 1.1...1.5 bar gauge pressure

If the measured "cold" control pressure differs from the nominal value, this may be due to one of the following faults:

- Fuel delivery for the control-pressure circuit too low or too high. Test fuel delivery.
Test specification = 160...240 cm^3/min.

- Fuel return from the warm-up regulator blocked or constricted (if control pressure too high).
Eliminate constriction.

- Warm-up regulator defective. Replace warm-up regulator.



14.7 Checking the "warm" control pressure:

The test is carried out with the engine switched off. The temperature of the engine is not important.

Open the valve screw of the directional-control valve (both screws in the case of KDEP 1034).

Switch on the electric fuel pump by bridging the electrical safety circuit:
Attach the plug to the warm-up regulator.
Control pressure now rises (the warm-up regulator in the process of shutting off) until the "warm" control pressure is reached.

Test specification for "warm" control pressure:
3.4...3.8 bar gauge pressure
(3.5...3.9 kgf/cm^2 gauge pressure)

If the measured "warm" control pressure differs from the test specification, this may be due to one of the following faults:

If control pressure too high:

- Fuel delivery for the control-pressure circuit too high.
Test fuel delivery.
Test specification = 160...240 cm^3/min.

- Fuel return from the warm-up regulator blocked or constricted.
Eliminate constriction.

- Warm-up regulator has hydraulic defect.
Replace warm-up regulator.

If control pressure too low:

- Power supply open-circuit.

Eliminate open circuit. Ensure that the plug is contacting properly.

- Battery voltage too low, voltage drop.

Eliminate voltage drop. Minimum voltage at connector: 11.5 V.
If necessary, repeat test with engine running in order to obtain the normal generator voltage of approx. 14 V when the vehicle is in operation.

- Fuel delivery for the control-pressure circuit too low.

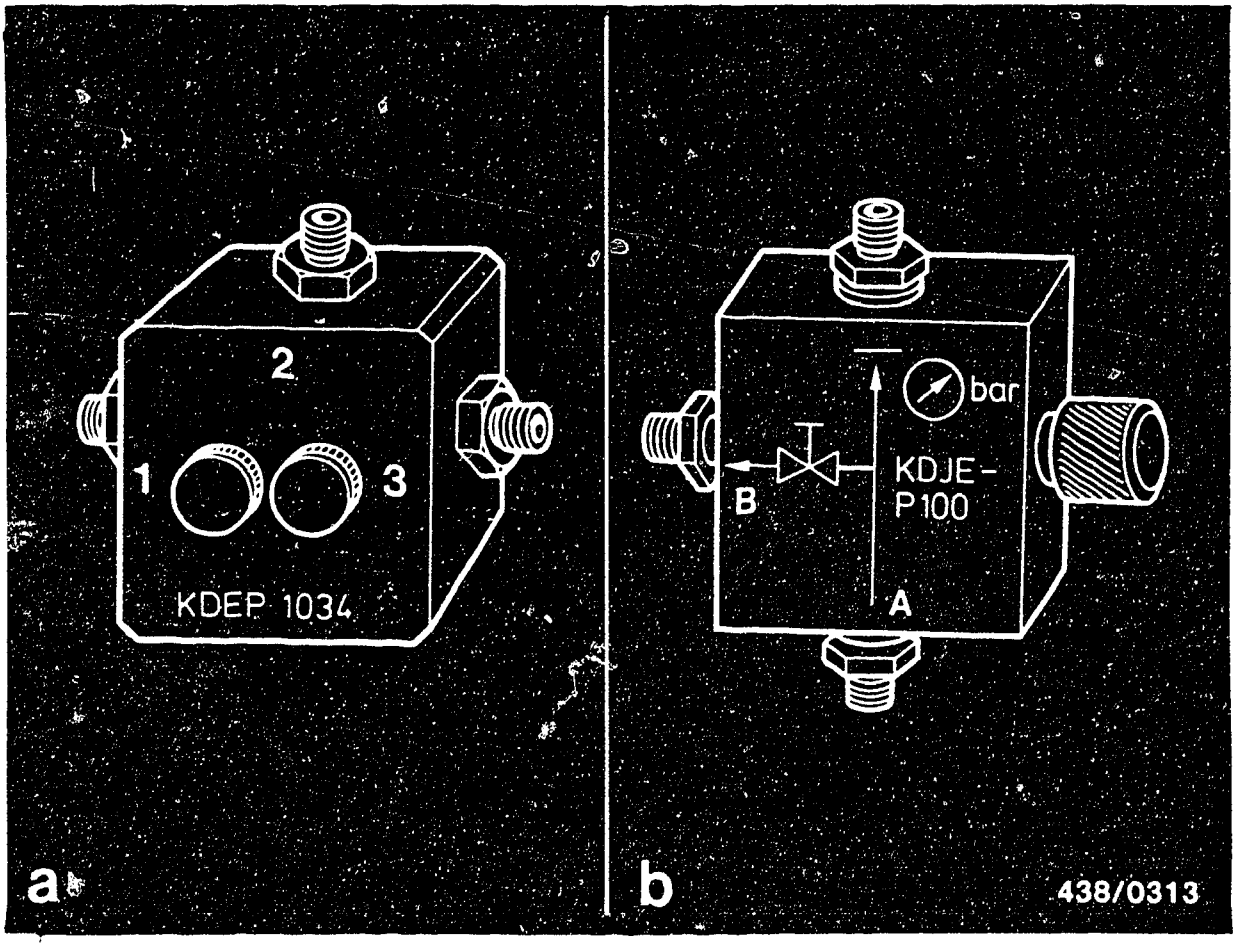
Test fuel delivery.
Test specification = 160...240 cm^3/min.

- Warm-up regulator defective. Heating coil open-circuit. Hydraulic defect.

Replace warm-up regulator.

If the warm-up regulator has been replaced or a defect has been eliminated, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates E 18.

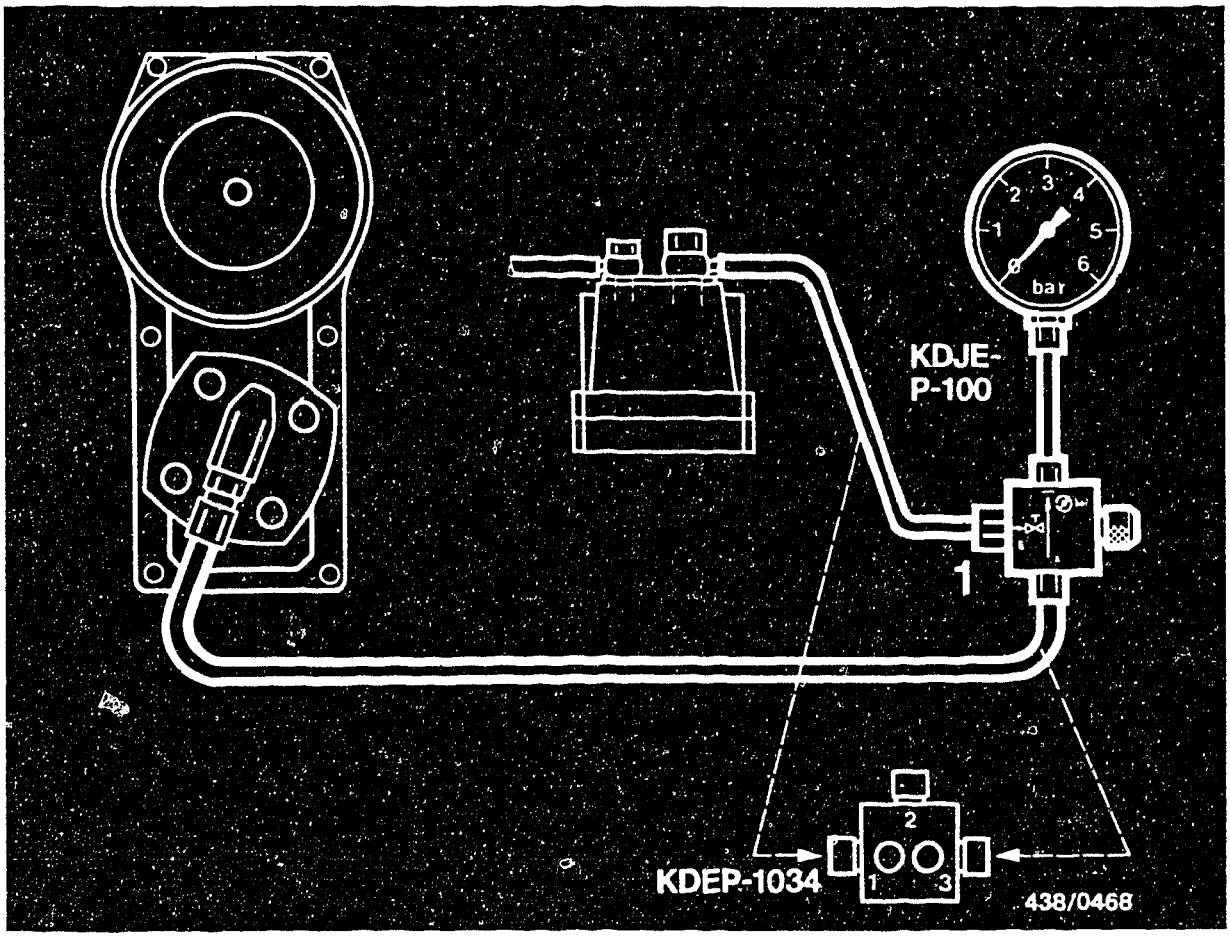


15. Testing and adjusting the primary (system) pressure:

15.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:
A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator).

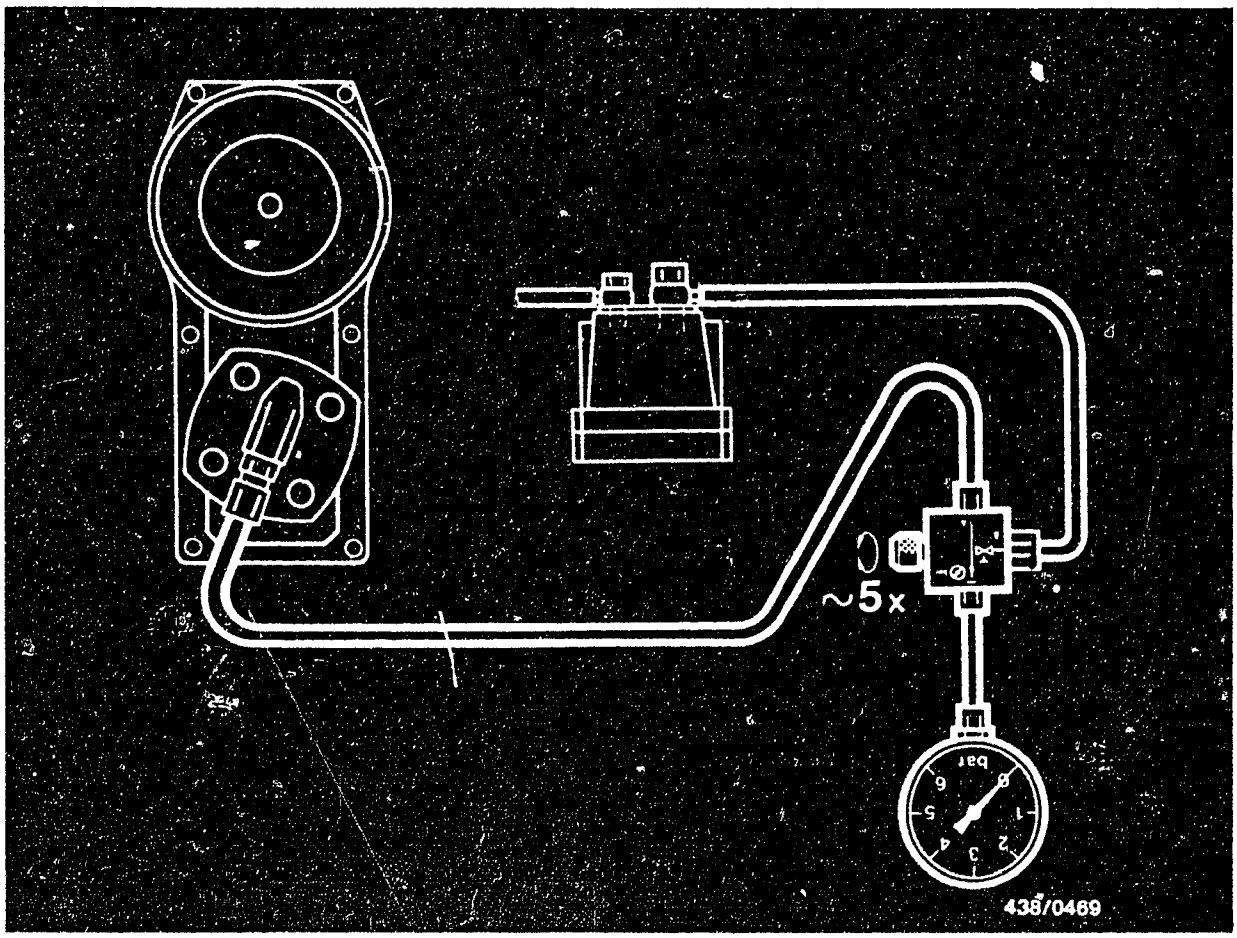
Caution:
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

Unscrew the control-pressure line (to warm-up regulator) from the fuel distributor and connect to port 1 or B of the directional-control valve.

Connect port 3 or A of the directional-control valve to the fuel distributor control-pressure connection port via the hose line pertaining to the pressure tester.



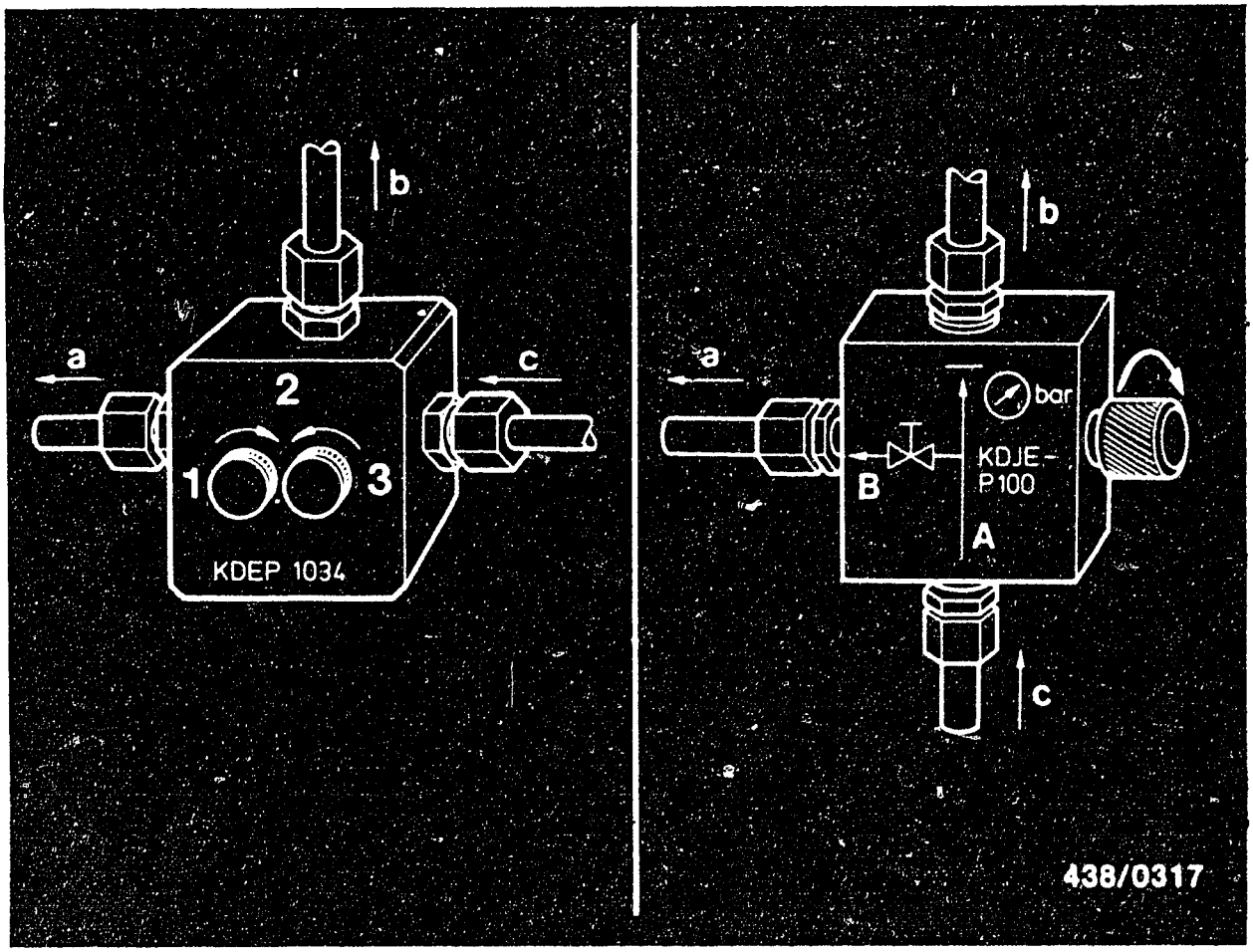
15.2 Bleeding the pressure tester:

Disconnect the electric plug from the warm-up regulator and the auxiliary-air device.

Let the pressure gauge hang down (hose fully extended). Switch on the electrical fuel pump by bridging the electrical safety circuit.

Open and close the valve screw of the directional-control valve (or valve screw 1 in the case of KDEP 1034) in a 10-second rhythm about 5 times.
Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).

Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

15.3 Testing the primary pressure:

The test is performed with the engine switched off.
The temperature of the engine is not important.
Close the valve screw of directional-control valve KDJE-P 100.
In the case of KDEP 1034, close valve screw 1, open valve screw 3.

Switch on the electric fuel pump by bridging the electrical safety circuit.
The pressure gauge now indicates the primary pressure.

Test specification - primary pressure:
4.5...5.2 bar (4.6...5.3 kgf/cm^2) gauge pressure.

Possible causes for too low a primary pressure:

- Fuel supply faulty
(Delivery of electric fuel pump too low).

- Primary pressure set incorrectly.

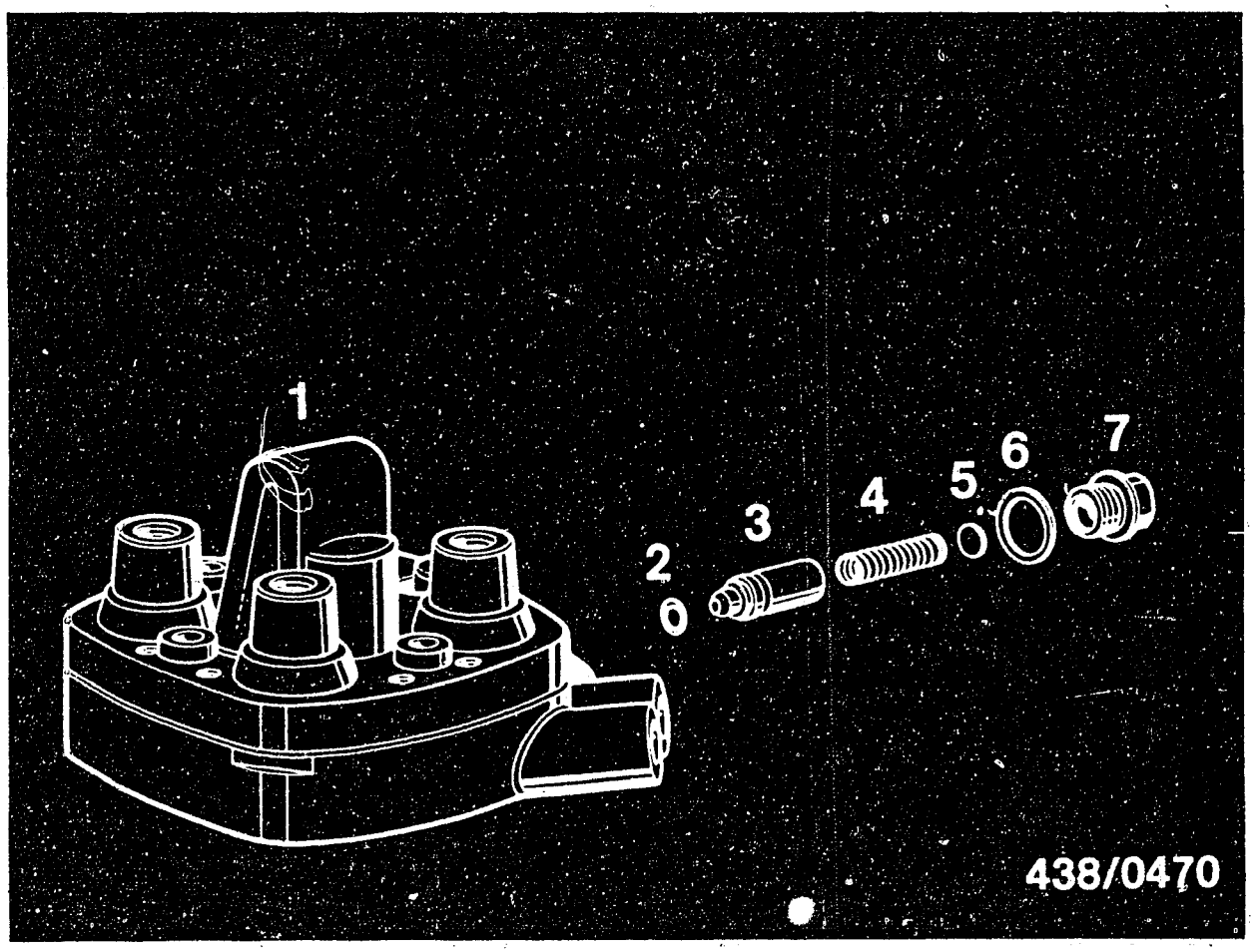
A precondition for readjustment of the primary pressure is always that the fuel supply is in order.
Test specification for delivered-fuel quantity = 750 cm^3 /30s

Possible causes for too high a primary pressure:

- A restriction in the return line leading to the fuel tank.

- Primary-pressure regulator set incorrectly.

For this reason, before readjusting too high a primary pressure, always first check the condition of the return line leading to the fuel tank.

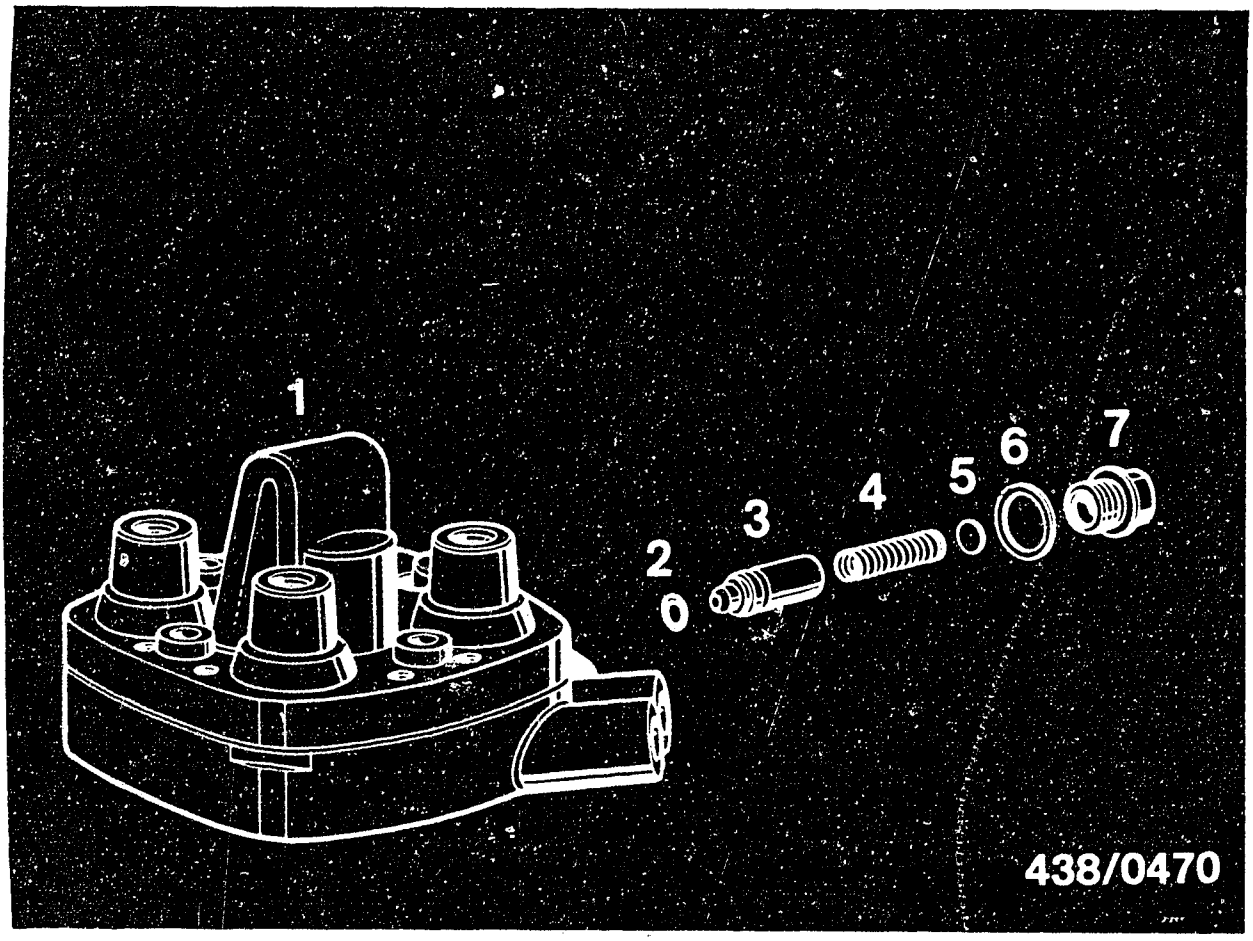


1 = Fuel-distributor housing
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = Flat seal ring
7 = Screw plug

15.4 Adjusting the primary pressure:

Primary-pressure adjustment value:

4.7...4.9 bar (4.8...5.0 kgf/cm²) gauge pressure.



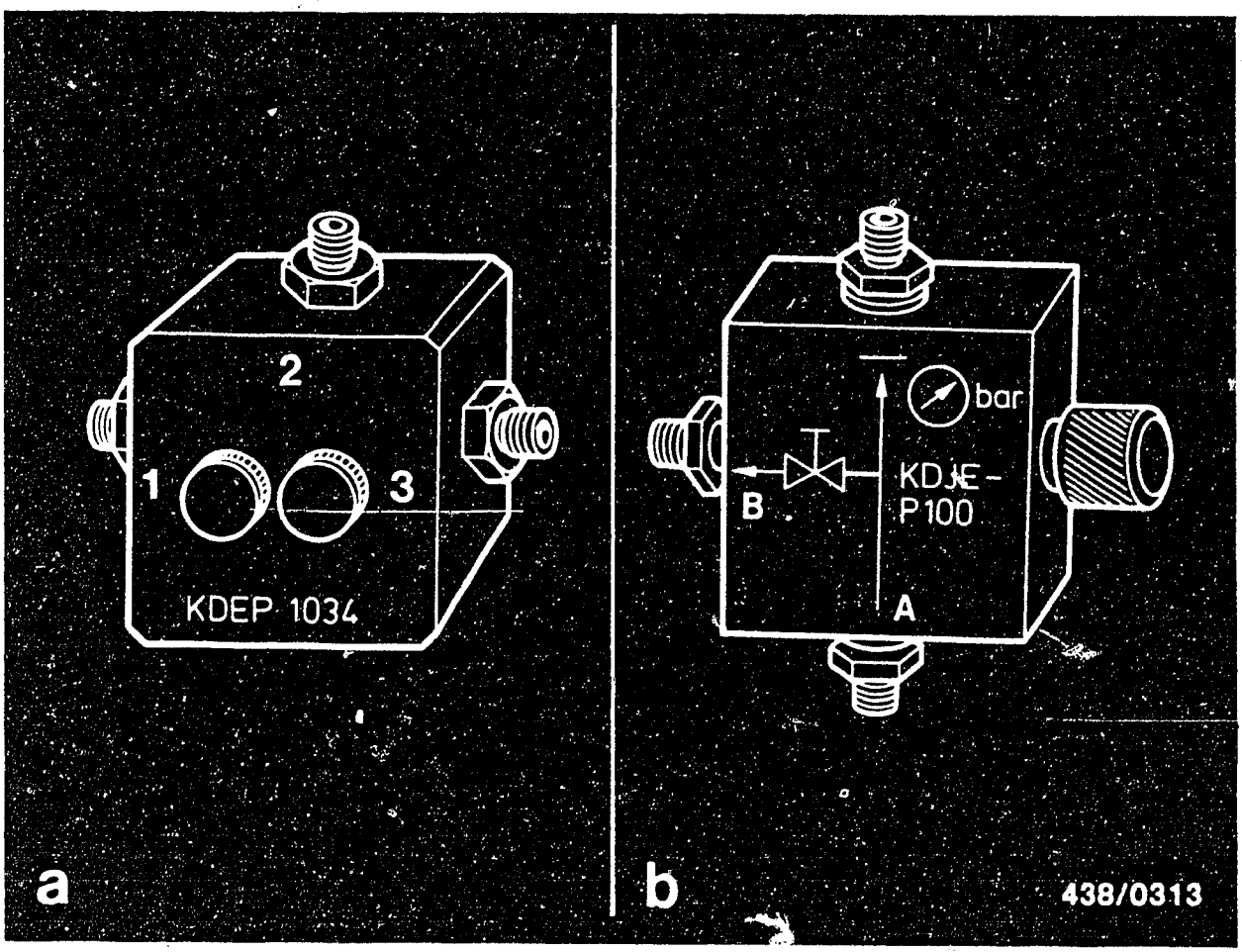
The primary pressure is readjusted by replacing the shims (Item 5).

Note:

0.1 mm more of shim thickness means about 0.15 bar pressure increase and vice versa.

To do this, screw out the large screw plug (Item 7) together with the push valve. After carrying out the adjustment, always fit the screw plug with a new flat seal ring (Item 6) and O-ring (Item 2).

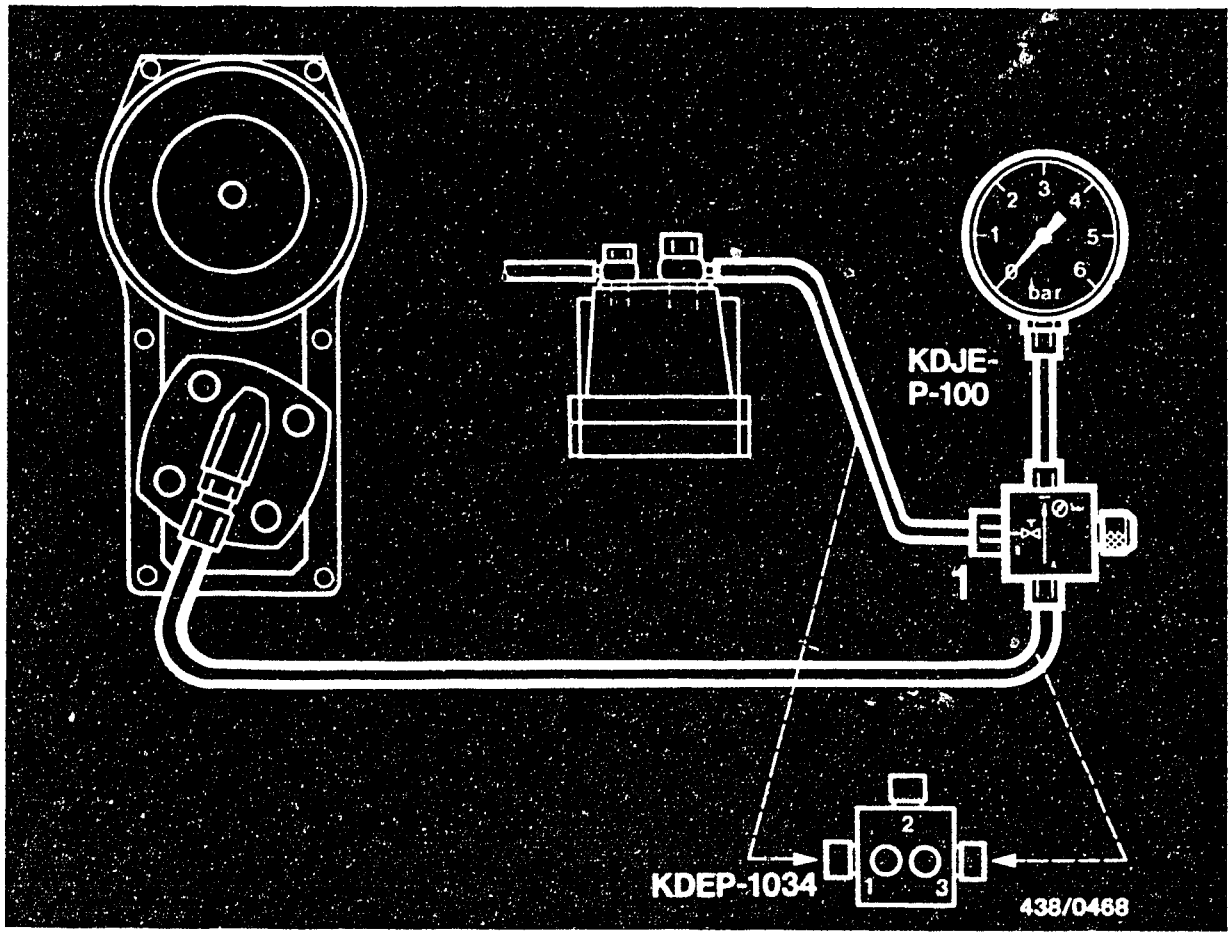
The control piston (Item 3) of the primary-pressure regulator must not be lost. It was matched specially to the fuel distributor housing in the manufacturing plant and therefore is the only part of the primary-pressure regulator which must not be replaced.



16. Testing the entire fuel system for leaks.

16.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

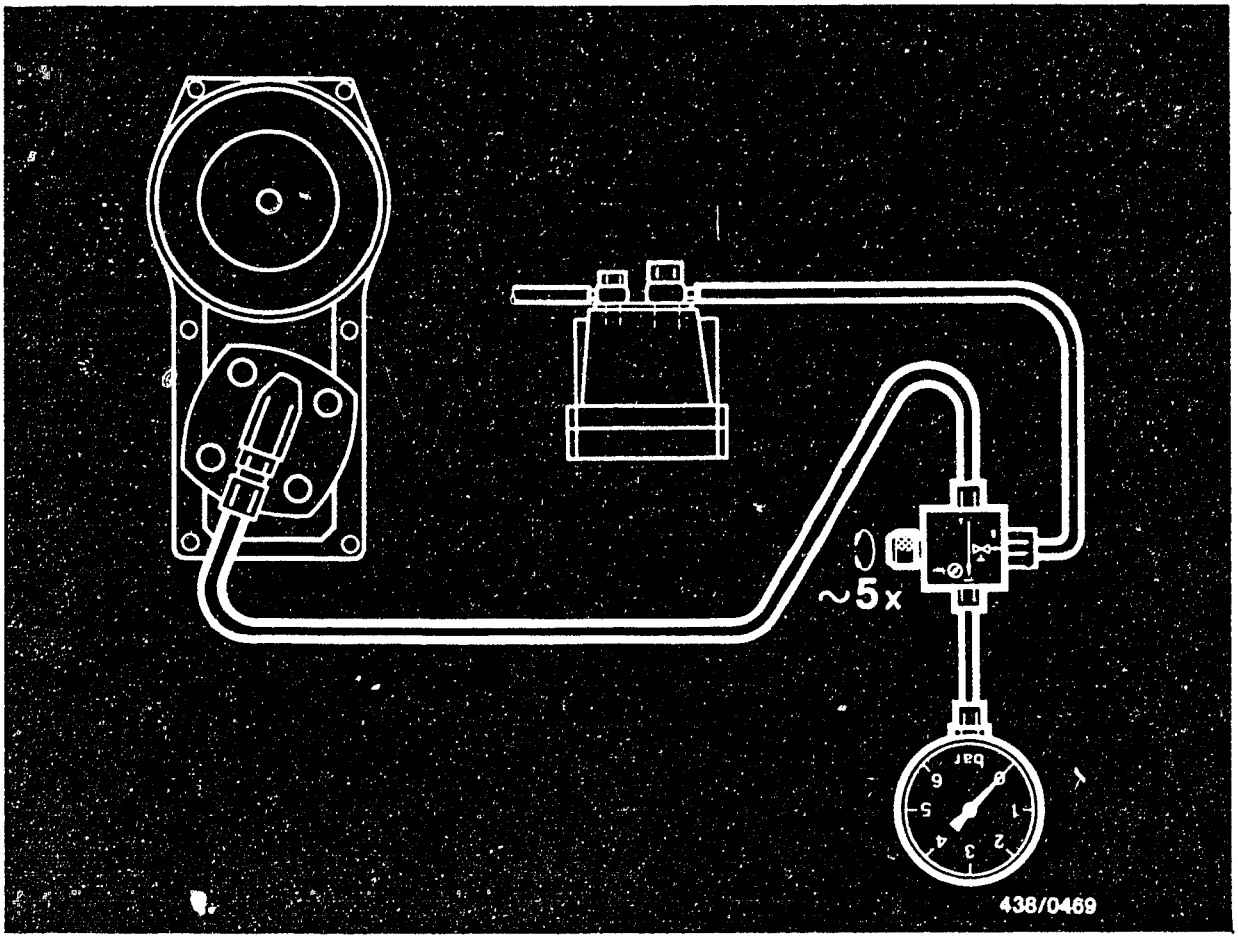
The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:
A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)
Caution:
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

Unscrew the control-pressure line (to the warm-up regulator) on the fuel distributor and connect to connection 1 (or B as the case may be) of the directional-control valve.

Connect connection 3 (or A) of the directional-control valve to the control-pressure connection of the fuel distributor using the hose line belonging to the pressure tester.



16.2 Bleeding the pressure tester:

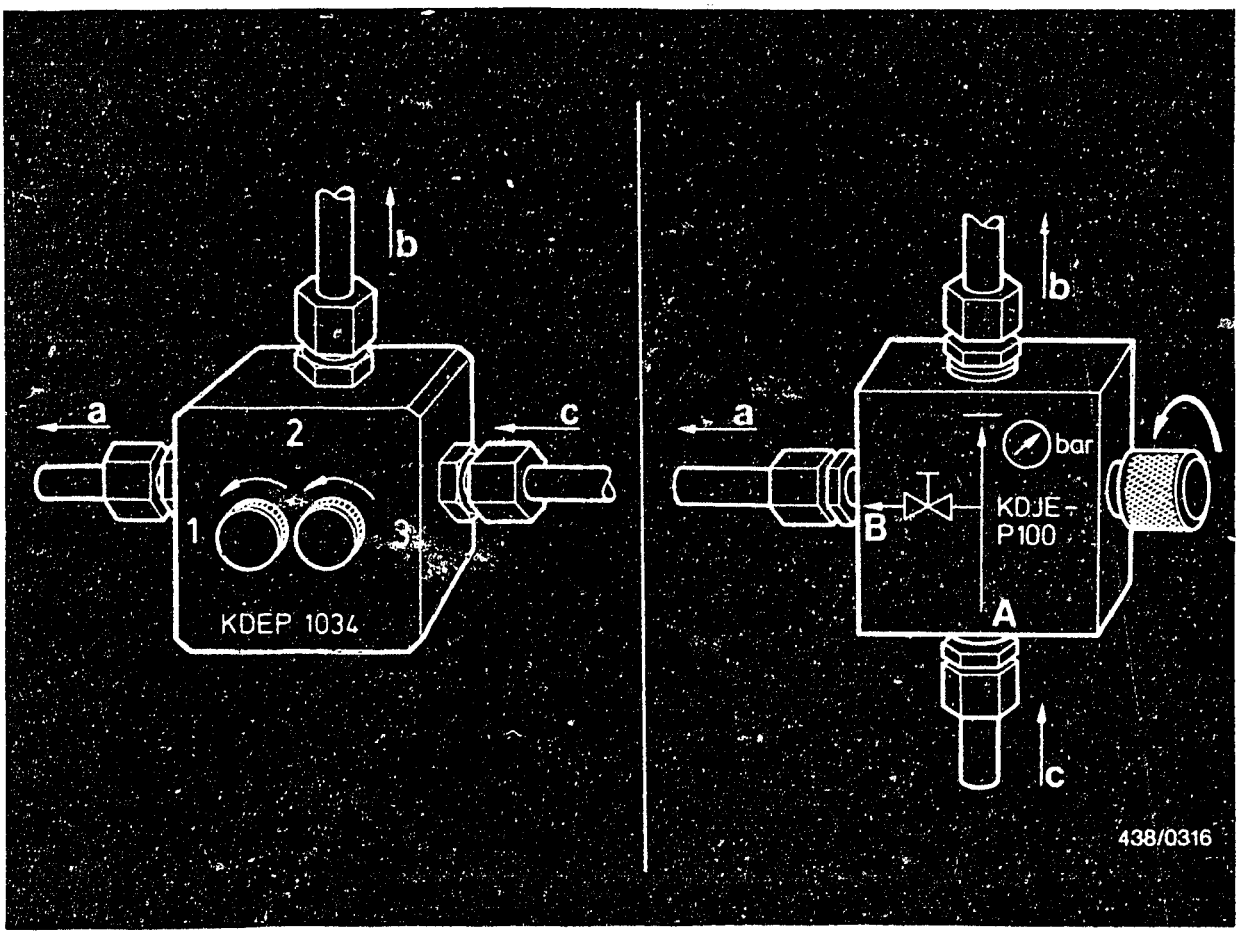
Disconnect the electric plug from the warm-up regulator and the auxiliary-air valve.

Let the pressure gauge hang down (hose fully extended).

Switch on the electric fuel pump by bridging the electrical safety circuit:

Open and close the valve screw of the directional-control valve (valve screw 1 in the case of KDEP 1034) in a 10-second rhythm about 5 times. Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).

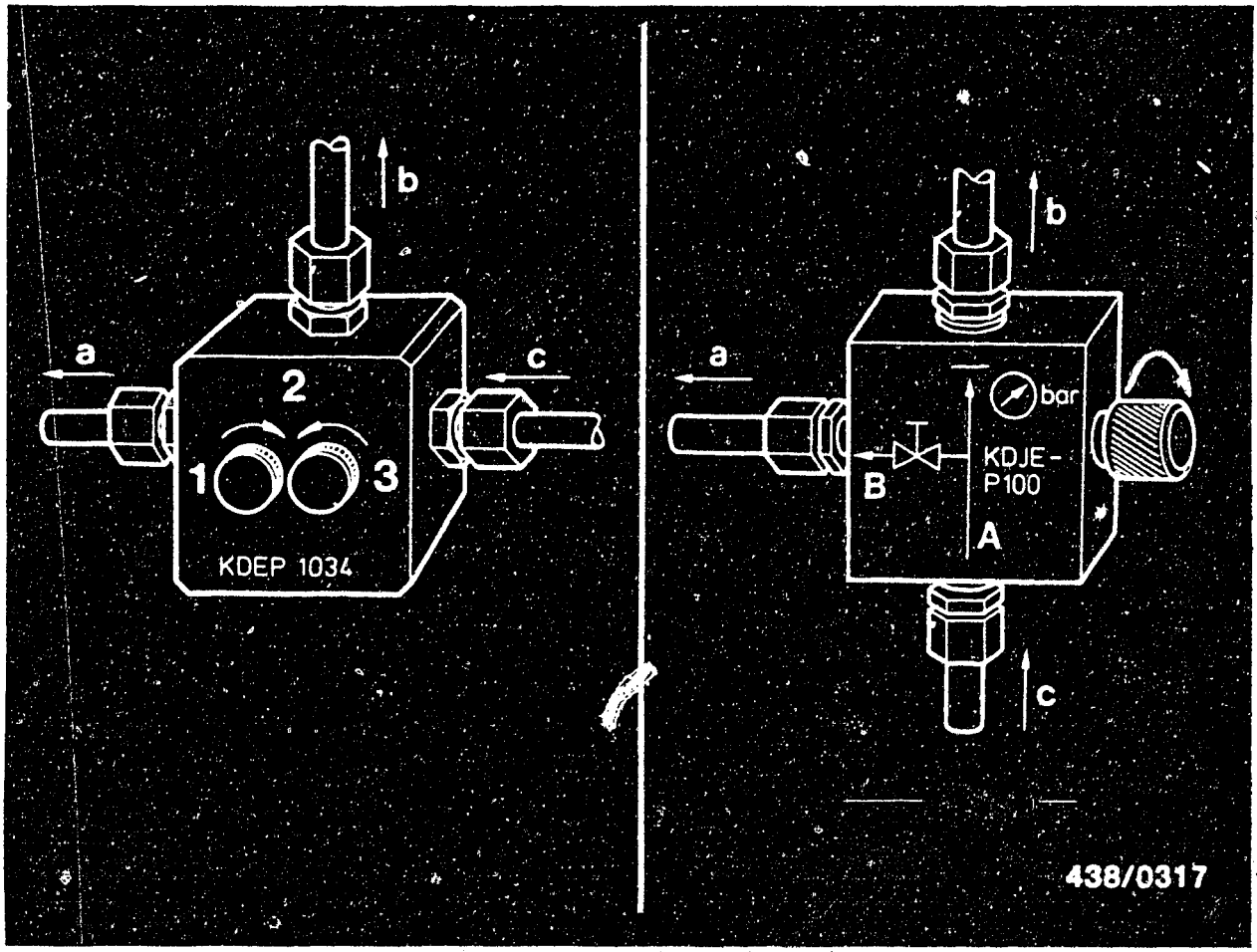
Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

16.3 Leak test

The test is performed with the engine switched off. Make the test with a warm engine but not immediately after the engine has been operated at a high temperature.
Open the valve screw of the directional-control valve (both valves in the case of KDEP 1034).

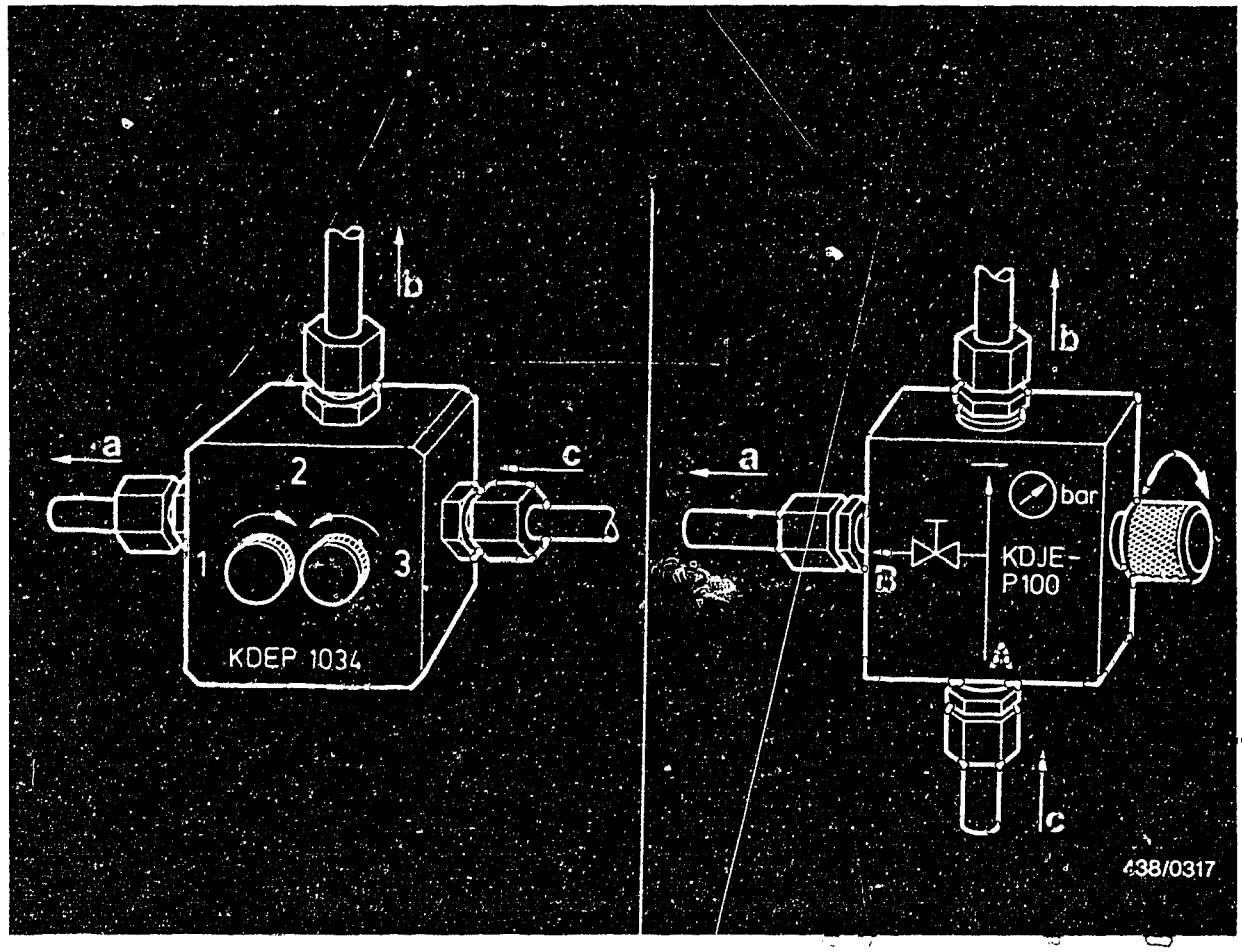


Switch on the electric fuel pump by bridging the electrical safety circuit until the warm-up regulator has ceased to operate ("warm" control pressure).

Switch the electric fuel pump off again and observe the drop in pressure on the pressure gauge.
Test specifications for leak test:

Minimum pressure after

10 minutes: 2.0 bar (2.1 kgf/cm²) gauge pressure
20 minutes: 1.7 bar (1.8 kgf/cm²) gauge pressure



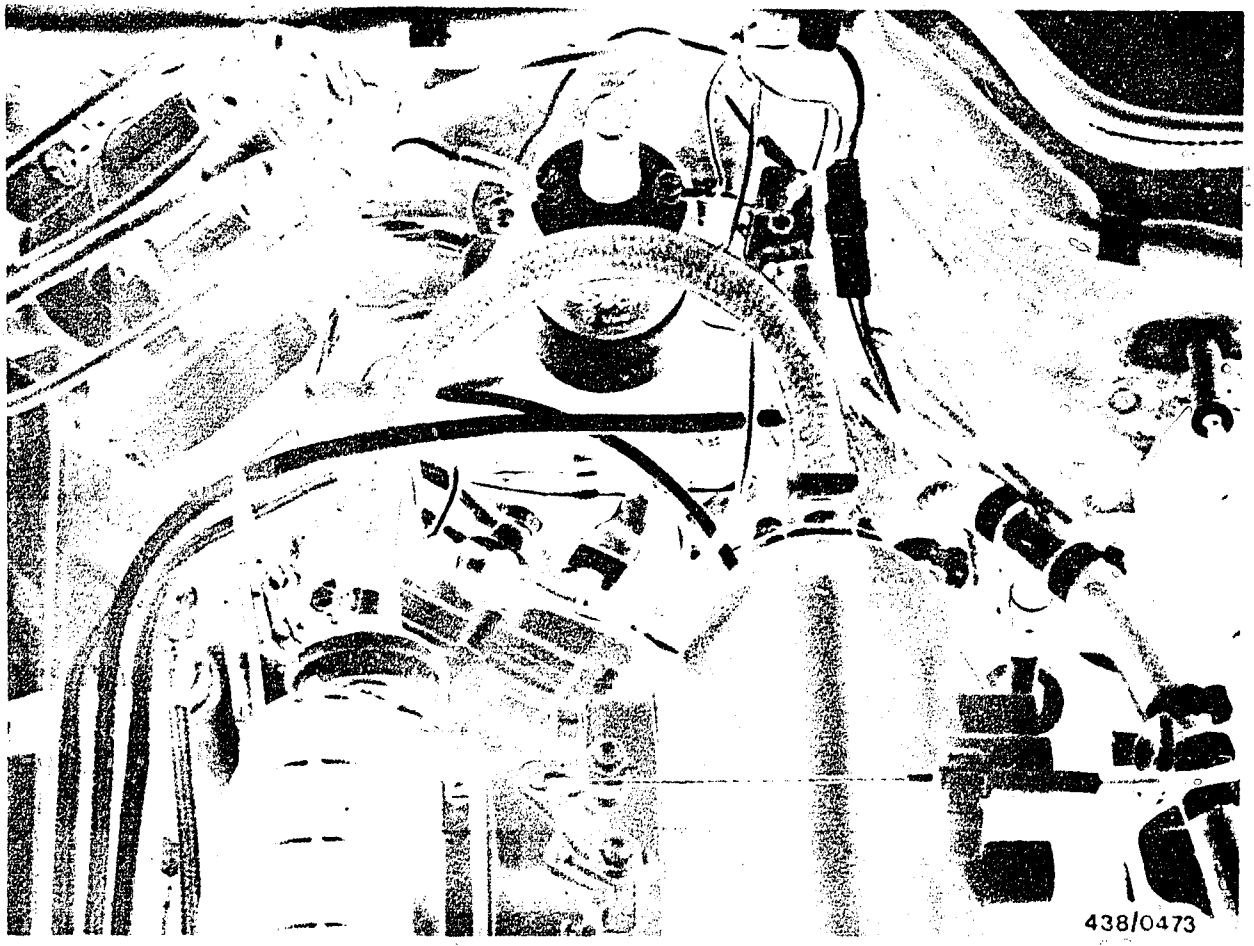
a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

If the pressure drops too quickly, repeat the test with the control-pressure circuit disconnected.

Position of the valve screws:
Close the valve screw of the directional-control valve KDJE-P 100.
In the case of KDEP 1034, close valve screw 1, open valve screw 2.

If the same result is found, the leak is in the primary-pressure circuit.

If the test results are correct during the second test, the leak is in the control-pressure circuit.



16.4 Possible causes of defect in the primary-pressure circuit:

Non-return valve in the pressure connection piece of the electric fuel pump has a leak.

The non-return valve is built into the tube fitting and cannot be exchanged.

In order to avoid having to change the whole electric fuel pump in the case of a leaking non-return valve, a parts set has been produced with a separate non-return valve, which can be used on the electric fuel pump installed in the Porsche 924 model.

Part number of the parts set: 1 587 010 003.
Contents: 1 tube fitting with built-in non-return valve
3 flat seal rings
1 cap nut

Installation:

Thoroughly clean the connection of the delivery line on the electric fuel pump.

Pinch off the intake hose (between fuel tank and electric fuel pump) (e.g. using hose clamper W 157 from Matra Co.).

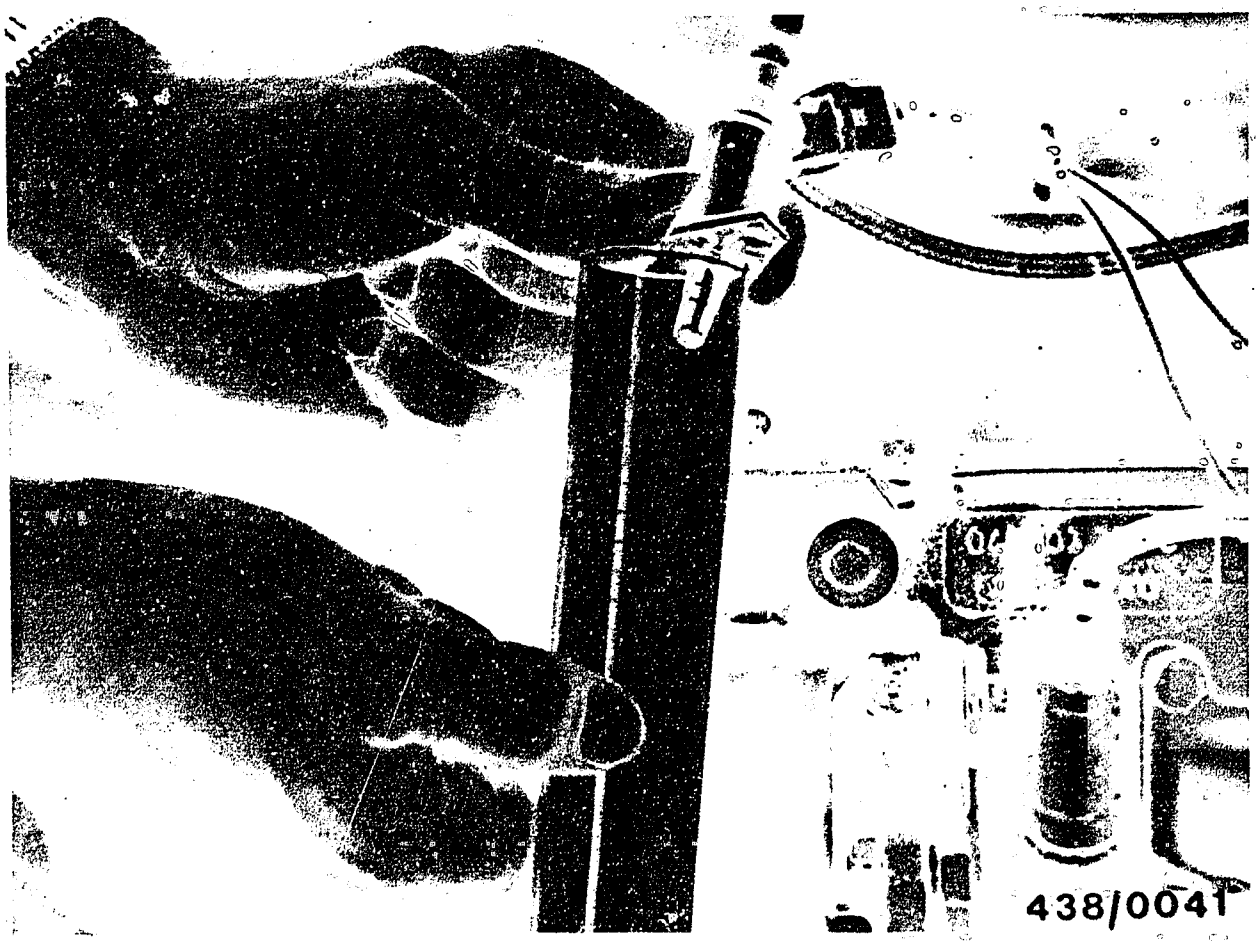
Unscrew the delivery line, collecting any escaping fuel, and screw the double threaded fitting out of the delivery fitting.

The defective original non-return valve remains in the electric fuel pump.

Screw the new non-return valve from the parts set into the delivery fitting with a seal ring and tighten to a torque of 17...25 Nm.

Connect the delivery line and remove the hose clamper from the intake hose.

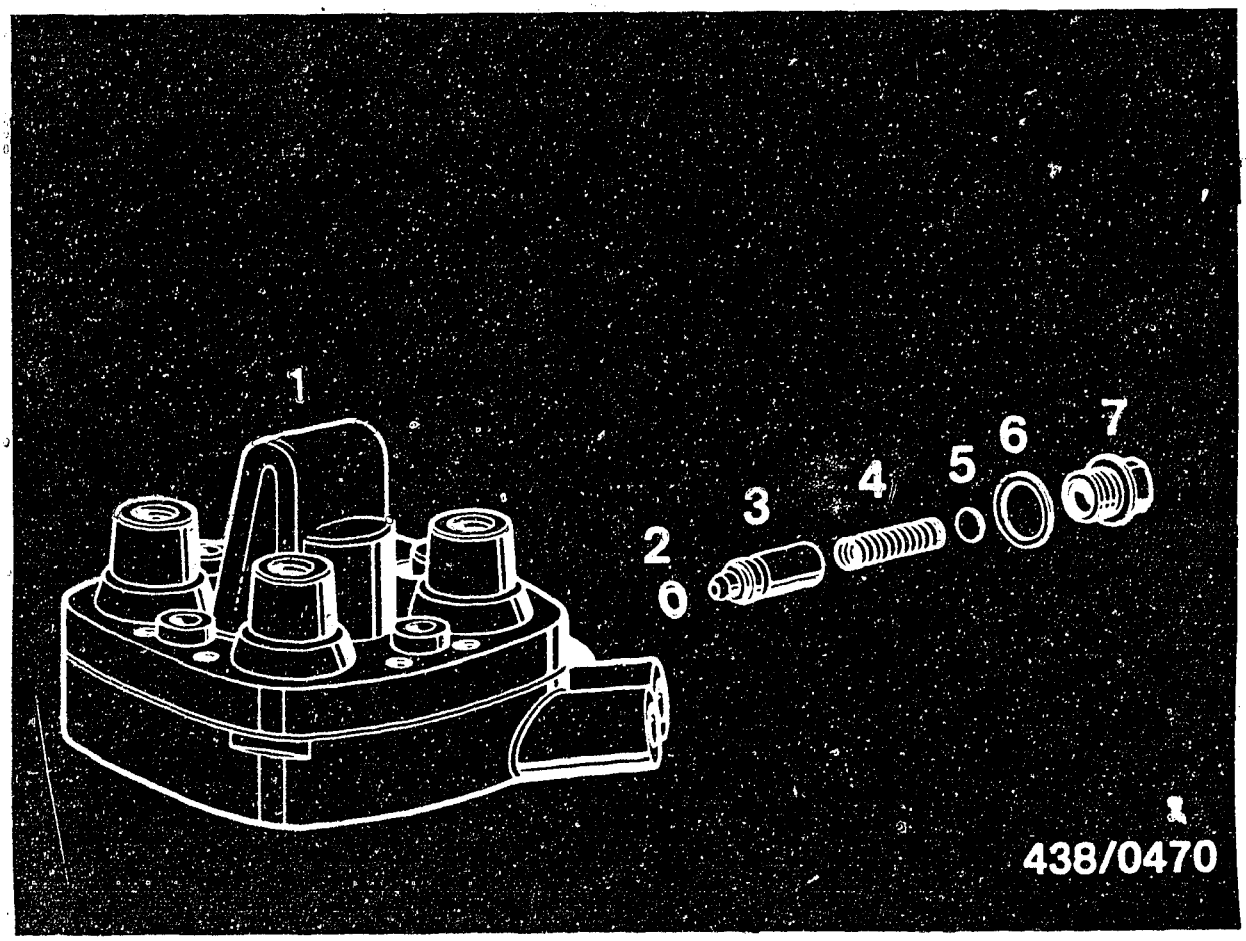
Check the connections for leaks with the electric fuel pump running.



- The cold-start valve has a leak.

Remove cold-start valve. Hose line remains connected.
Hold start valve in a suitable container (e.g. graduate).

Switch on the electric fuel pump by bridging the electrical safety circuit:
Dry off the nozzle of the cold-start valve.
No drops must fall from the nozzle of the start valve within the next minute.
Switch the electric fuel pump off again.
Replace the cold-start valve, if leaky.

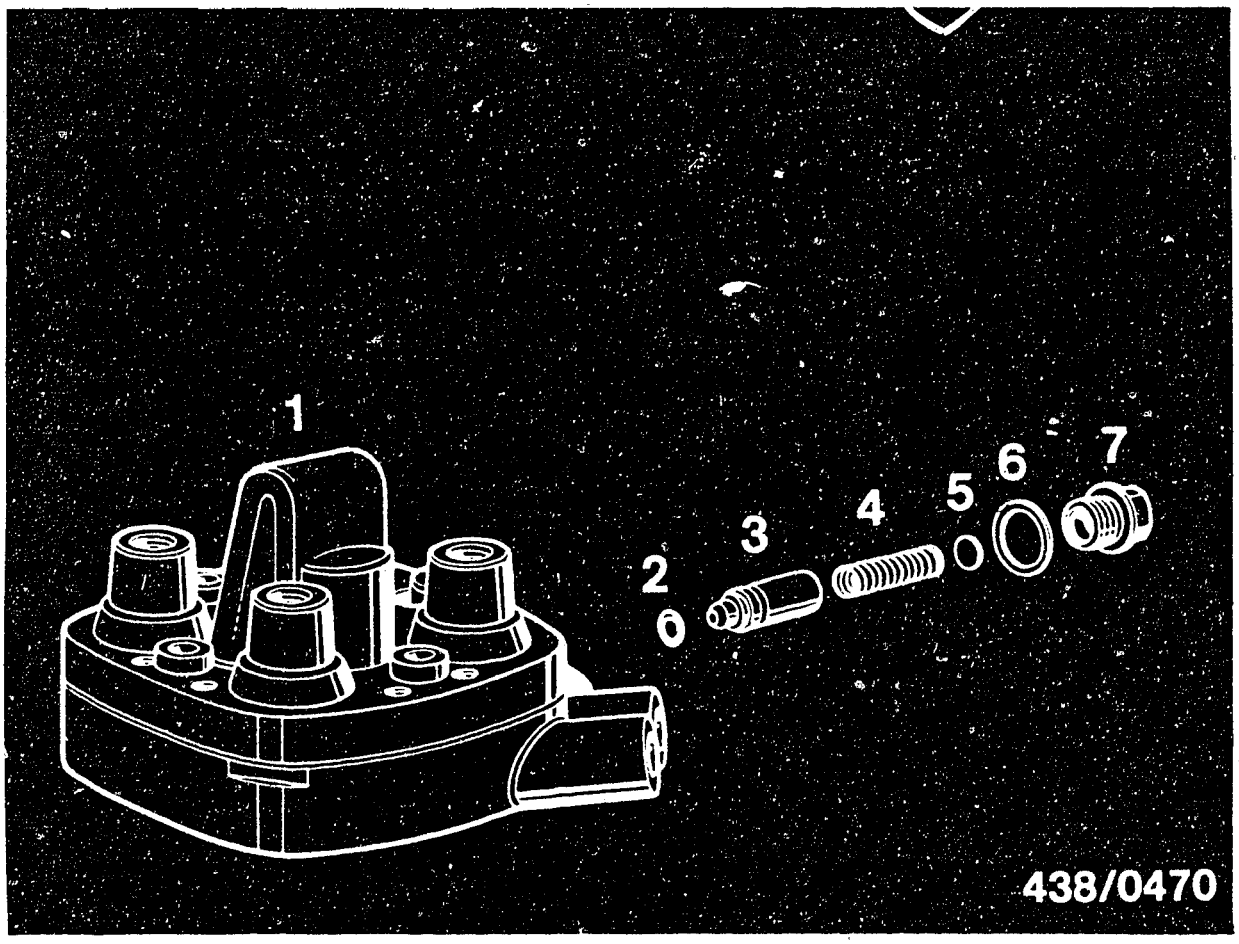


1 = Fuel distributor
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = Flat seal ring
7 = Screw plug

- Control-piston seal ring (O-ring) of the primary-pressure regulator has a leak.

Replace seal ring:
Clean fuel distributor in the region of the primary-pressure regulator.

Screw out screw plug (pay attention to shims), remove control spring and control piston.

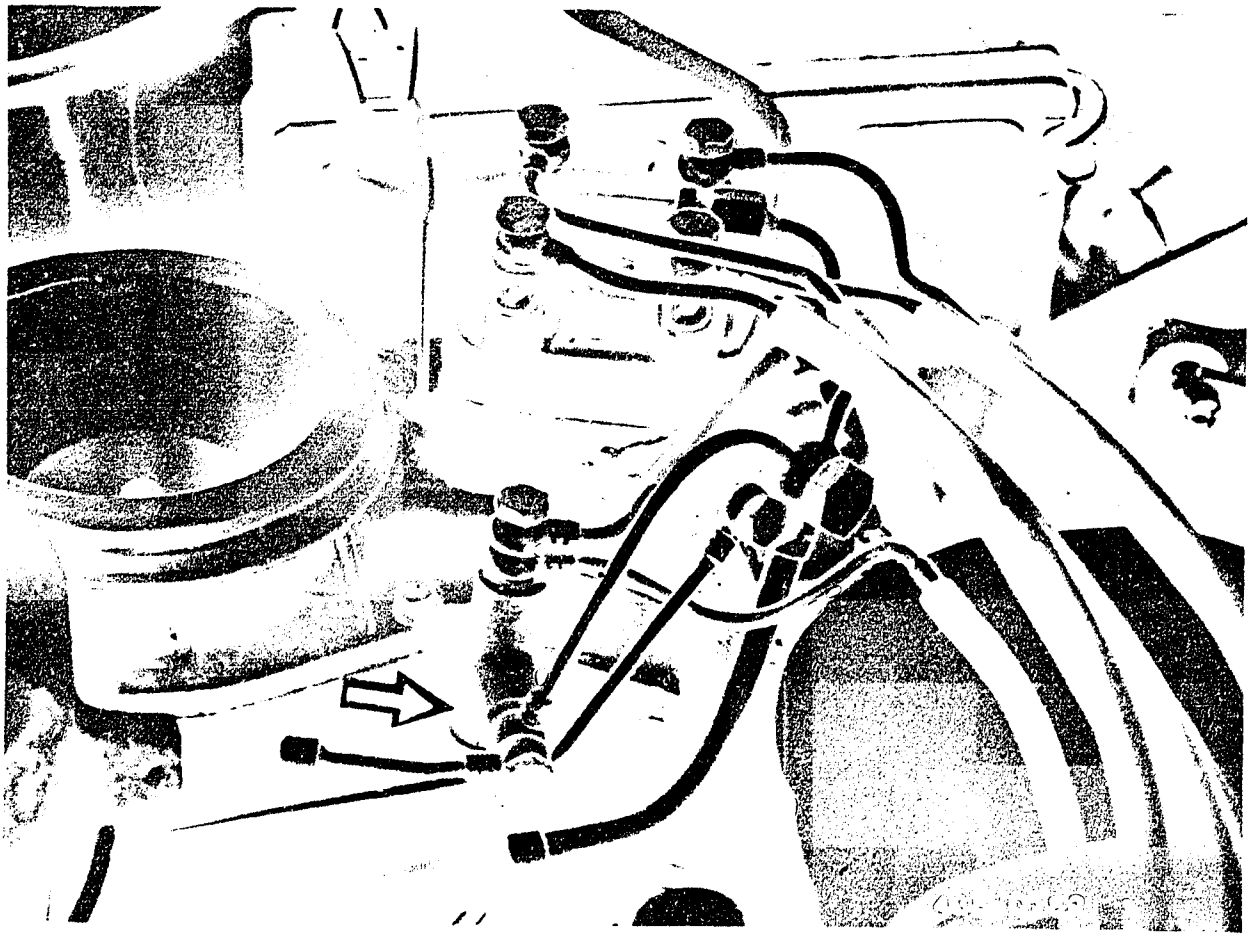


1 = Fuel distributor
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = Flat seal ring
7 = Screw plug

Replace seal ring (O-ring) (2) on control piston (3), install control piston and spring (4).

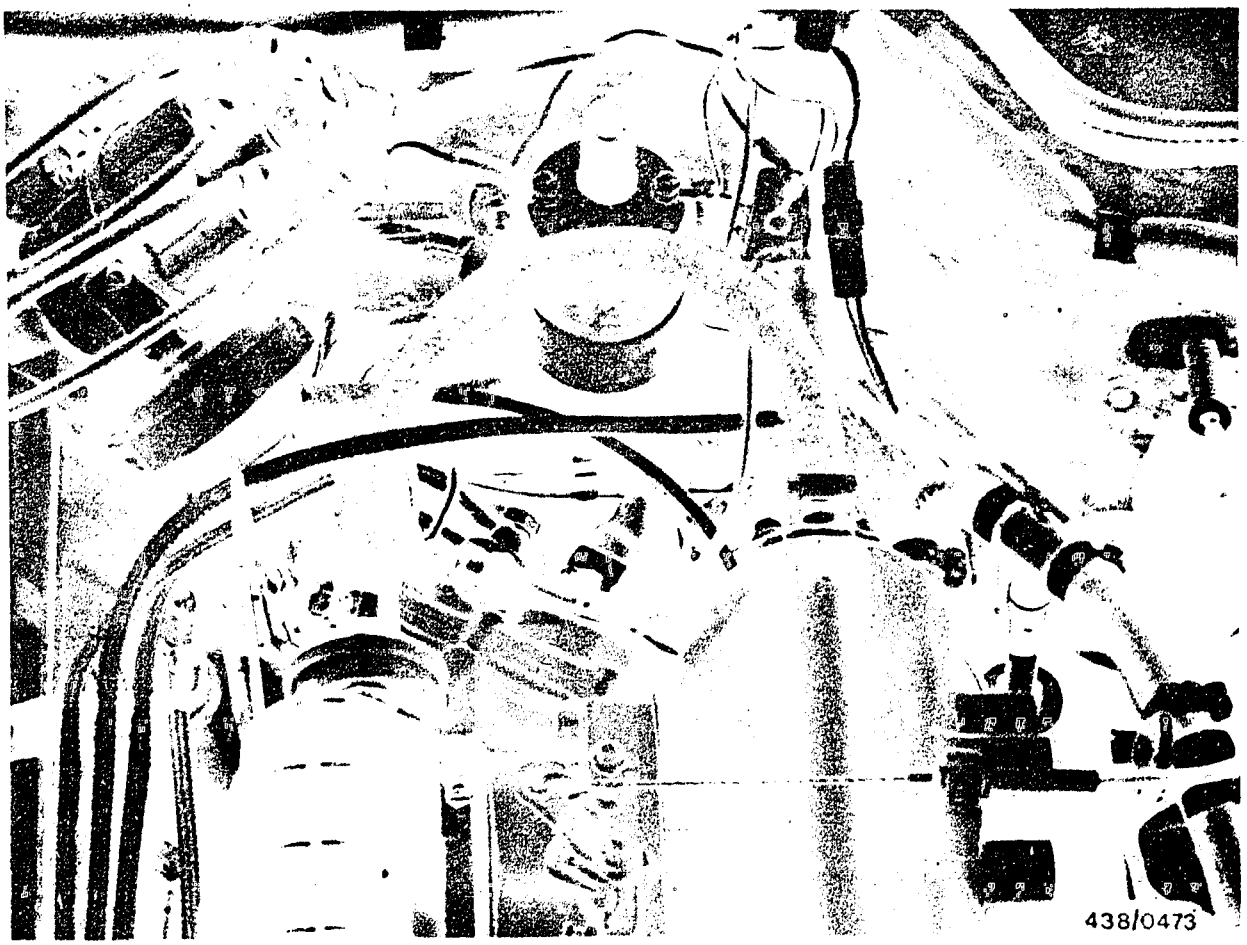
Screw in screw plug (7) with shims (5) (as found when removing) and new flat seal ring (6).

Finally, check the primary pressure and adjust if necessary (Coordinates C 21).



16.5 Possible causes of trouble in the control-pressure circuit:

Solenoid-operated valve for control-pressure reduction leaking.
Test:
Unscrew the fuel return line on the solenoid-operated valve and close off tight.
Note: The line leading to the left in the picture is only present on the USA model with lambda closed-loop control.
Switch on the electric fuel pump by bridging the safety circuit.
The solenoid-operated valve must not leak, i.e. no fuel must escape at the outlet.
Switch the electric fuel pump off again.
Replace the solenoid-operated valve if leaky.
Note: The solenoid-operated valve is not made by Bosch and should be purchased from a Porsche agent.



16.6 Warm-up regulator leaking.

If the preceding test on the solenoid-operated valve did not show any leaks, the only possible remaining cause of a leaking control-pressure circuit is the warm-up regulator.
Therefore replace the warm-up regulator.

Note: Thoroughly clean fuel connections before opening. When re-connecting, always use new seal rings.

17. Testing the injection valves.

Remove the injection valves for testing.
When loosening the fuel lines, apply counter-force at the fixed hexagon of the injection valves.

When refitting the injection valves, it is best to replace the O-rings on the valve stem (Porsche service part) in order to prevent leaks and thus the entry of unmetered air.
Always connect the fuel lines with new flat seal rings (1979 model with inlet unions and inlet-union screws).

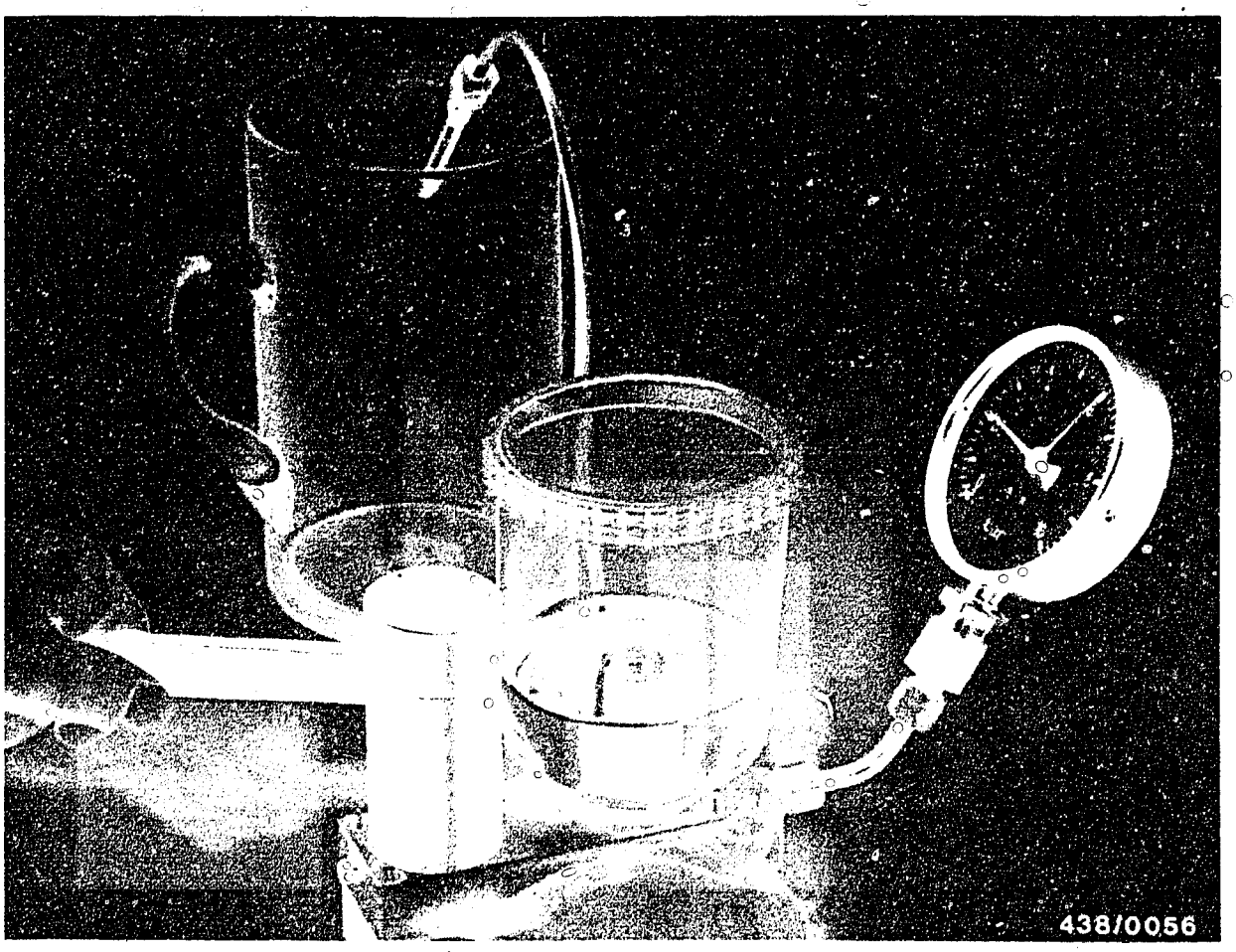
17.1 Test equipment and test media.

The following testing specification refers to valve testers KDJE-P400 (previously KDEP 7452) and 0 681 200 700.

Observe the test-media specification!

Test media: Calibrating fluid
(Shell K30, Esso Varsol, Shell Mineral Spirits 135)
or
Bosch part number 5 973 340 650
VS 14 942-CH
The calibrating fluid can be obtained in 5 l metal cans from the following supplier:
Firma
Oskar Gnamm GmbH & Co
D-7531 Kämpfelbach-Bilfingen

Caution: For safety reasons, never use normal gasoline or similar inflammable or combustible liquids.
Even with calibrating fluid, be sure to observe the local official regulations.

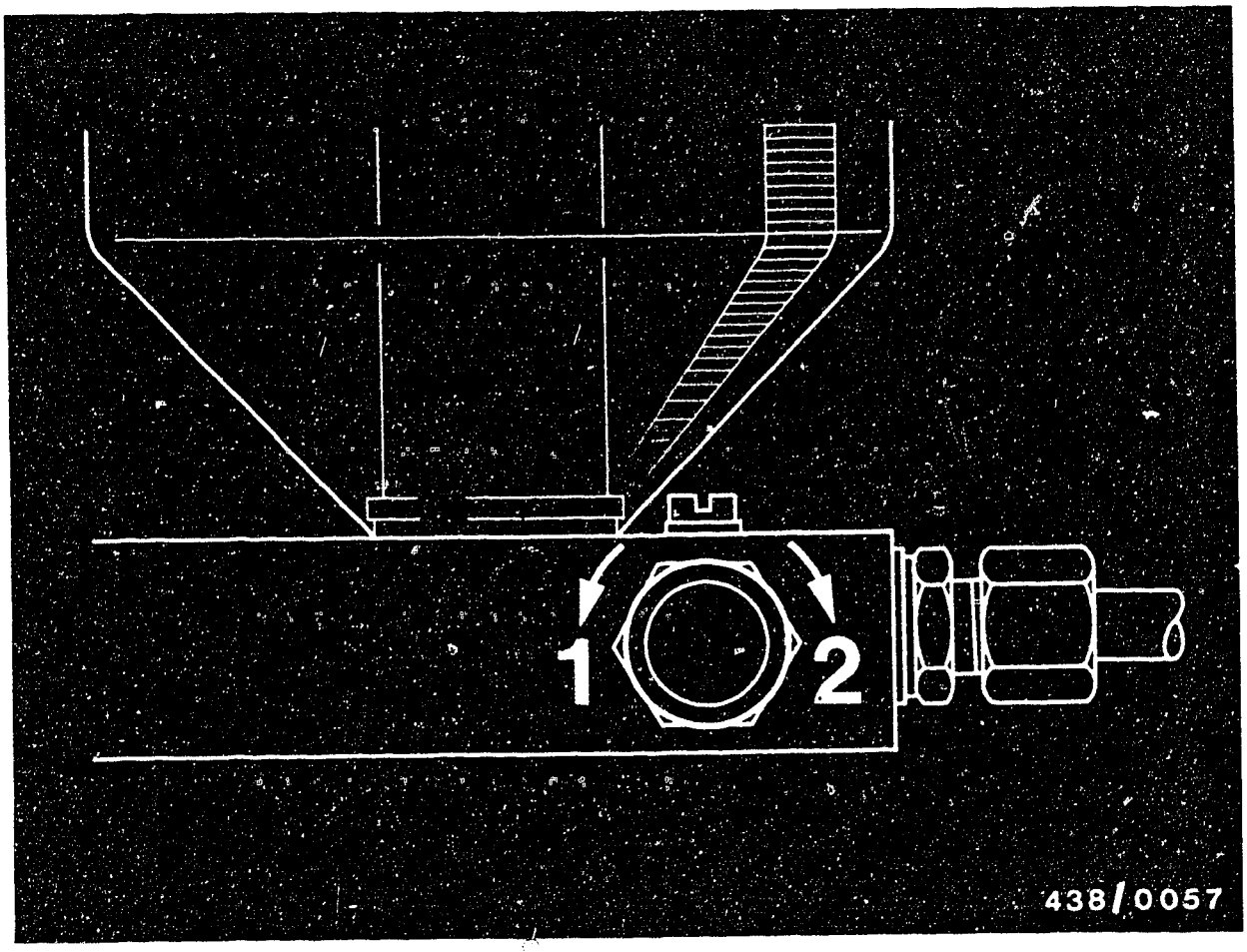


17.2 Connecting the injection valve to the tester

Remove injection valve and connect it to valve tester. Bleed the discharge tubing by moving the lever back and forth several times with the union nut open. Then tighten the union nut.

17.3 Checking for dirt

Move the hand lever slowly (about 2 seconds per stroke) back and forth with the stopcock on the pressure gauge open. If the pressure does not build up to 1...1.5 bar gauge pressure, the injection valve has a bad leak (caused, for example, by dirt stuck in it).
You can try to flush the injection valve clear by moving the lever back and forth several times strongly. If this attempt is successful, continue the test. If it is not possible to flush the valve clear, replace it.

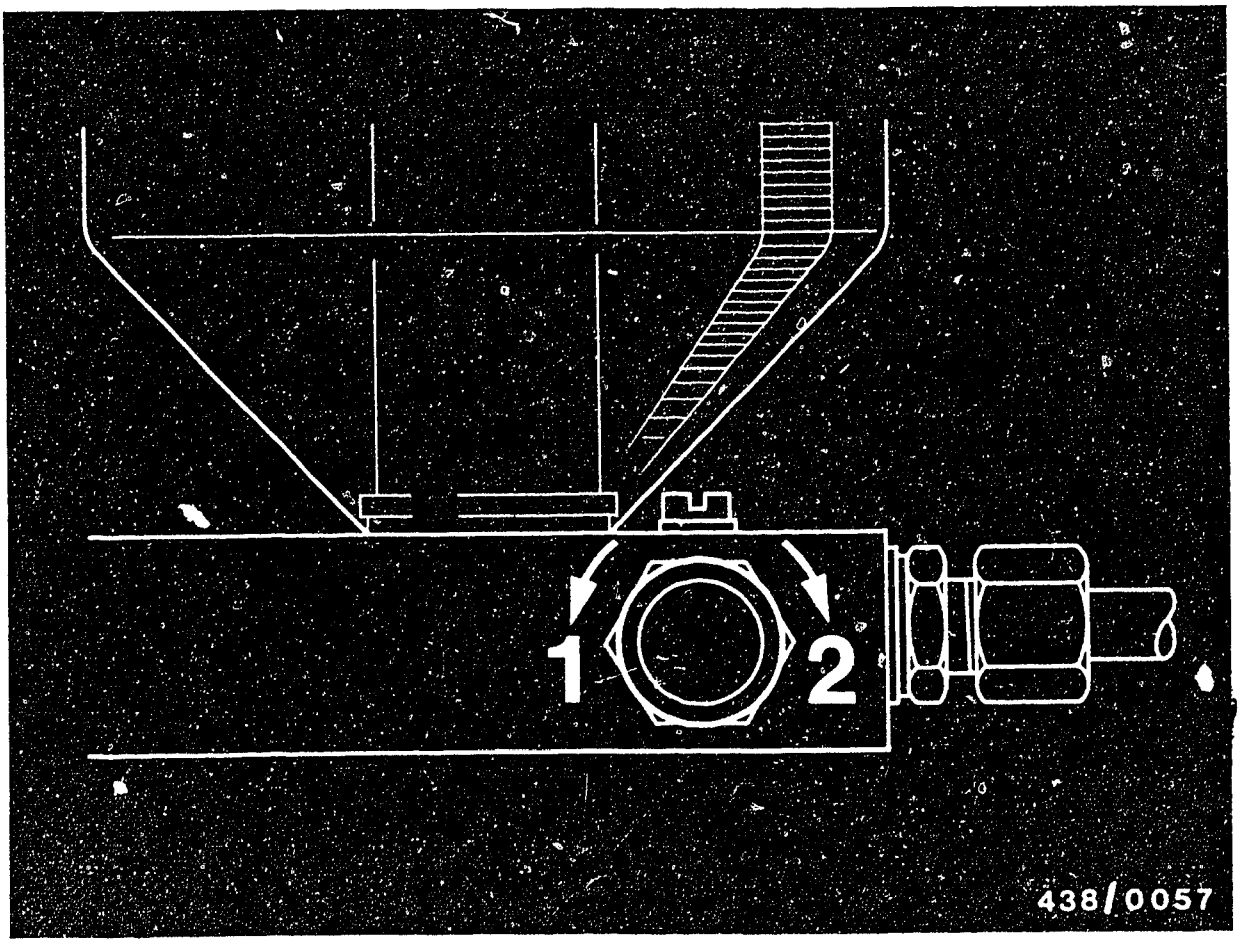


1 = Open
2 = Close

17.4 Testing the opening pressure

Injection valve Part No.	Test specifications - opening pressure (gauge pressure)
0 437 502 015/...016 (1980 model)	3.0...4.1 bar (3.1...4.2 kgf/cm²)
0 437 502 013	2.7...3.8 bar (2.8...3.9 kgf/cm²)

With the stopcock closed, flush the valve out and bleed it with several rapid movements of the lever.



Open the stopcock and test the opening pressure by moving the lever slowly (about 2 seconds per stroke). If the opening pressure is outside tolerance, replace the injection valve. Individual valves can also be interchanged within a set.

17.5 Leakage test

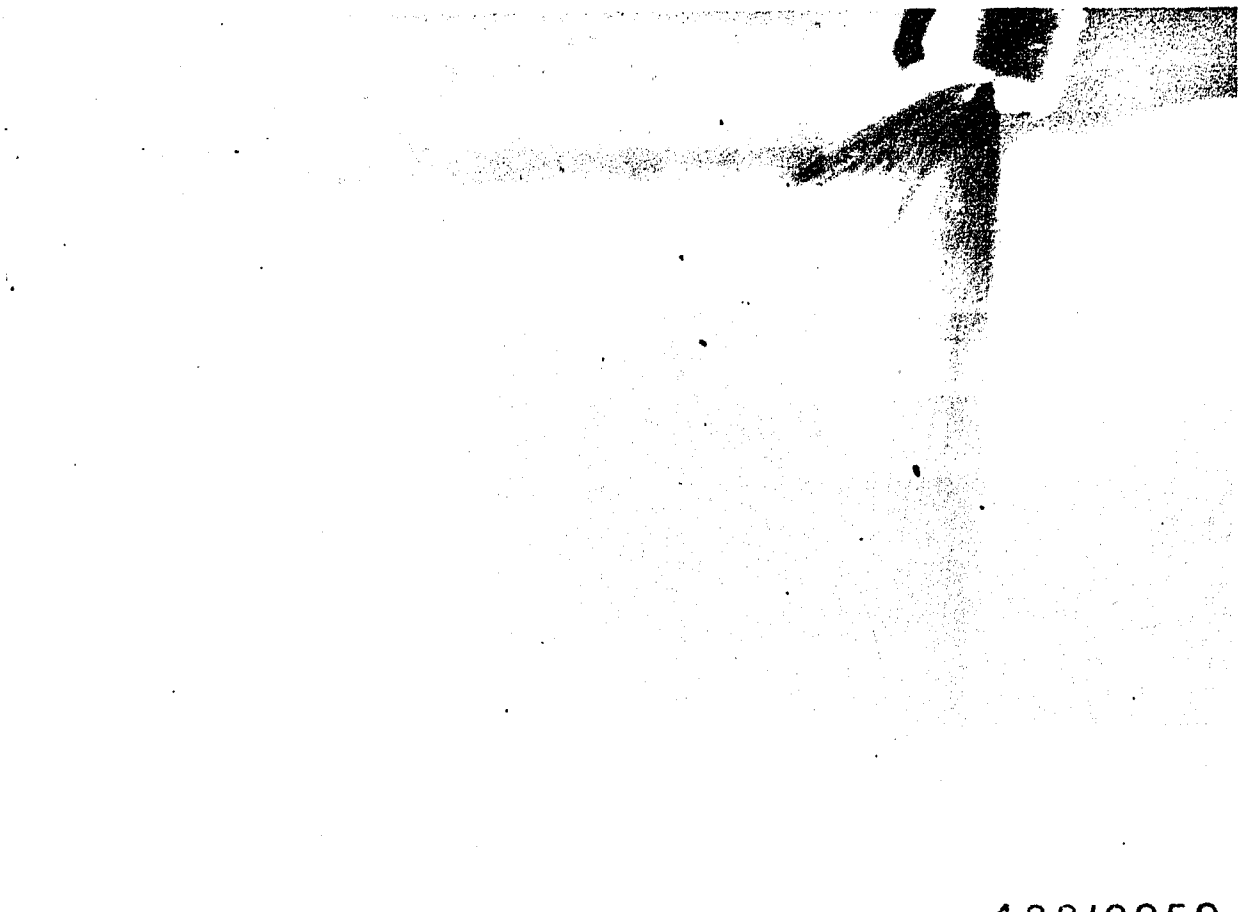
Open the stopcock, build the pressure up slowly to a value 0.5 bar under the opening pressure determined previously (but not less than 2.8 bar gauge pressure), and hold it constant at that level. No drops must now fall from the valve for the next 15 seconds.

43810058

17.6 Chatter test, evaluation of spray

Move the lever back and forth at about 1 stroke per second. As this is done, the valve must chatter. No drops of fuel must form at the mouth of the valve. The valve must not produce a "cord spray". Formation of a single-sided, atomized spray within an overall spray angle of about 35° is permissible (see example given in illustrations).

Illustration shows good spray formation.



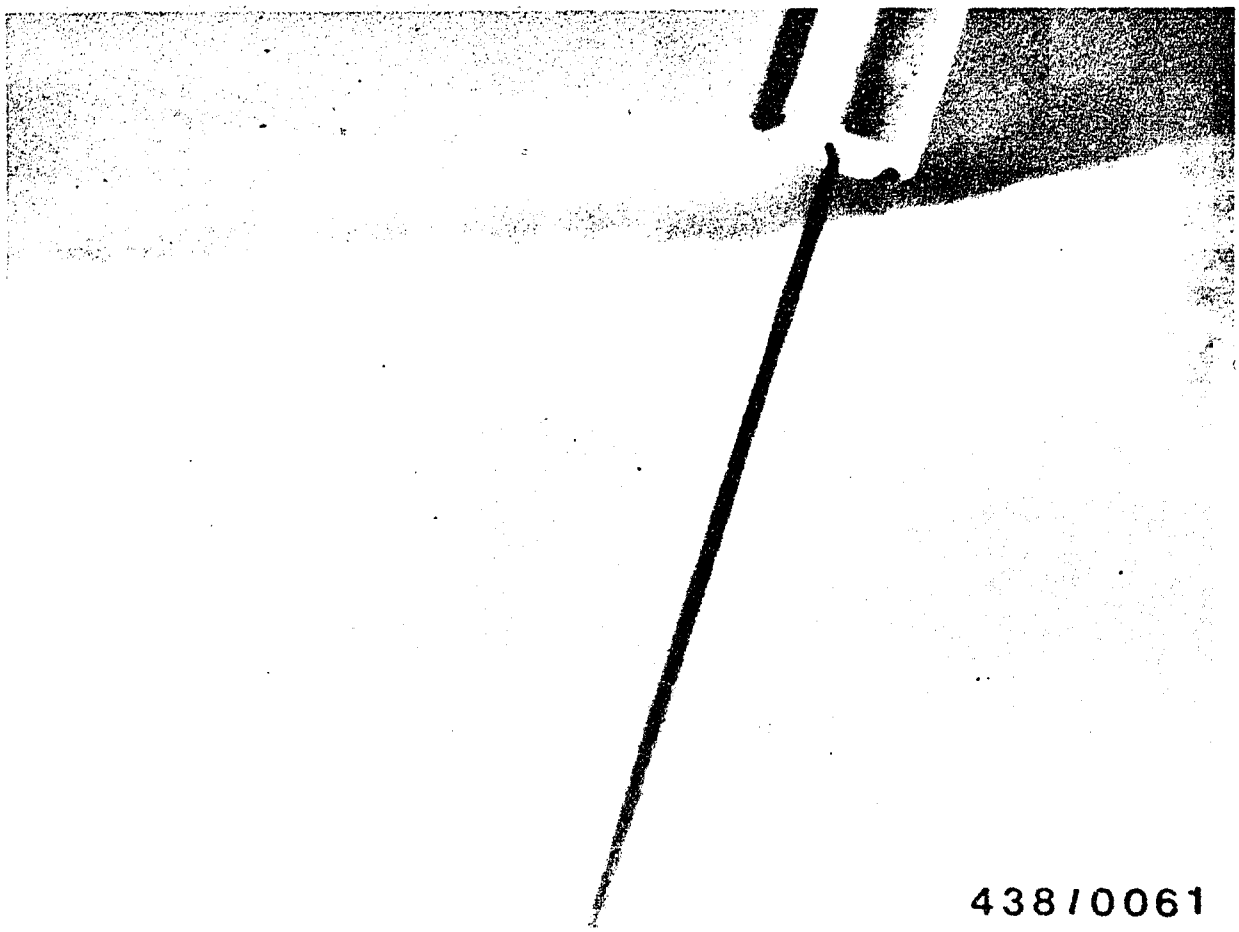
438/0059

Illustration shows single-sided but nevertheless good spray formation.

438/0060

Poor spray formation; replace injection valves.

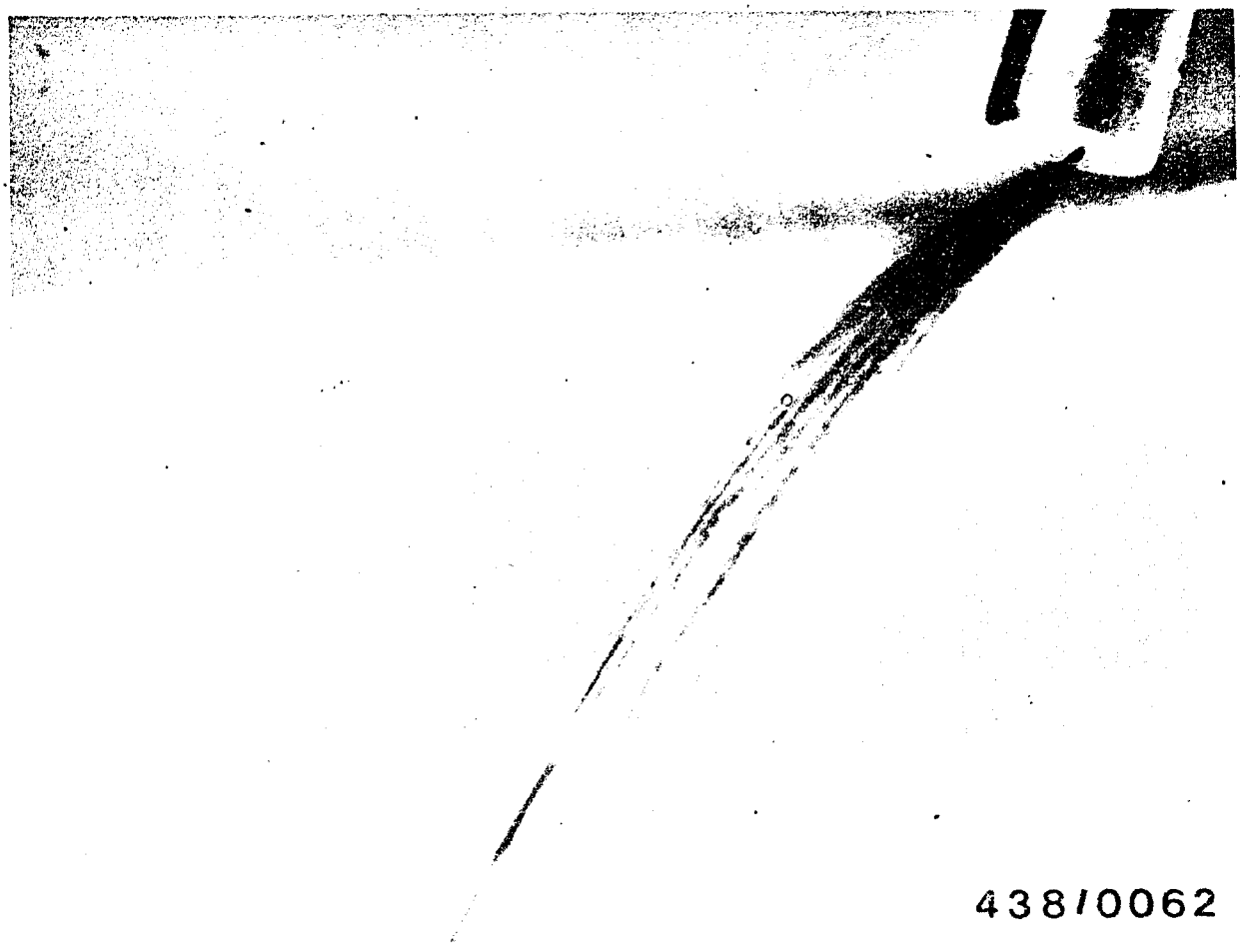
Illustration shows drop formation.



438/0061

Poor spray formation; replace injection valves.

Illustration shows "cord" spray.



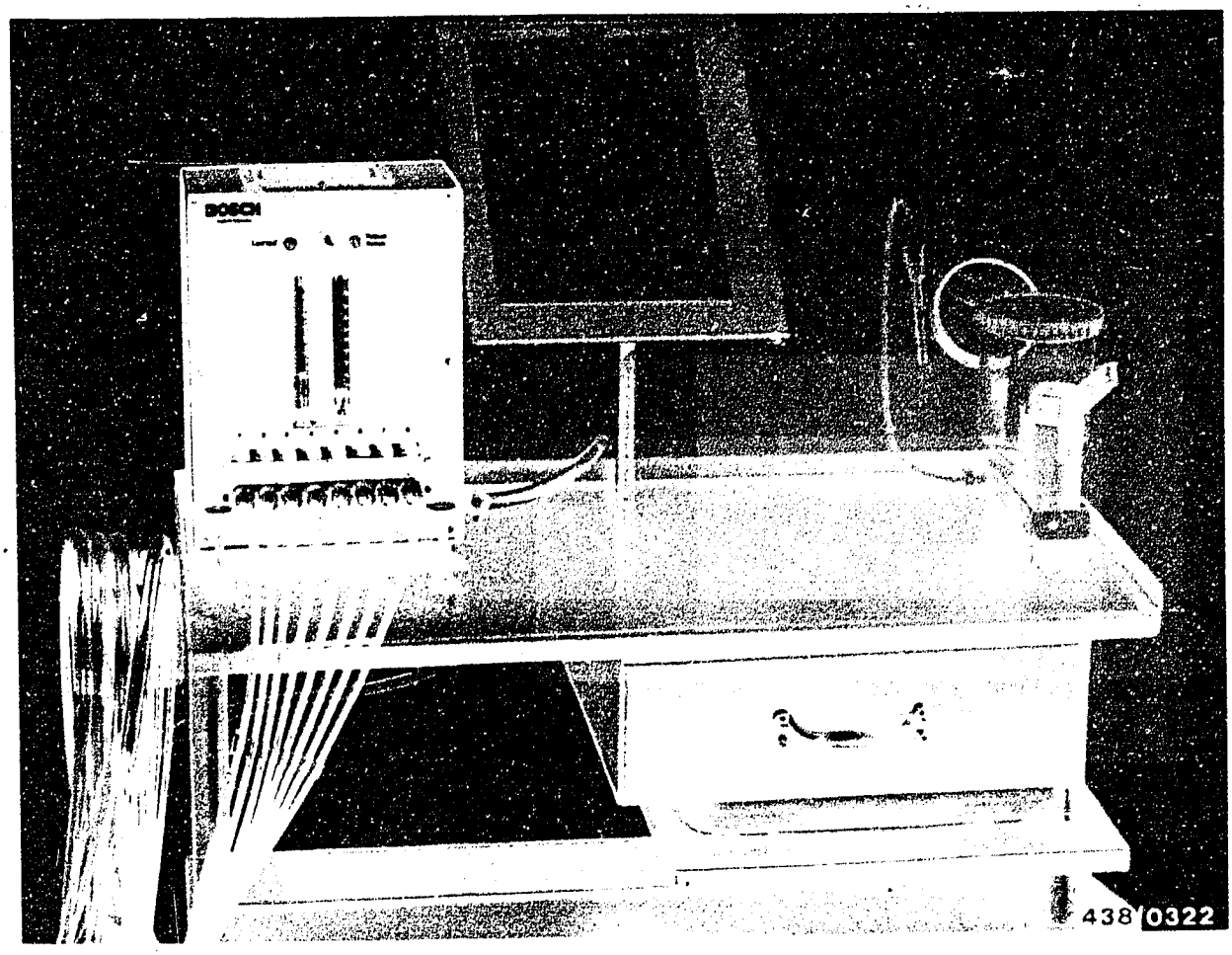
438/0062

Poor spray formation; replace injection valves.

Illustration shows "spray in strands".

If defective injection valves have been replaced, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates E 18.



18. Comparative measurement of fuel delivery of fuel distributor outlets.

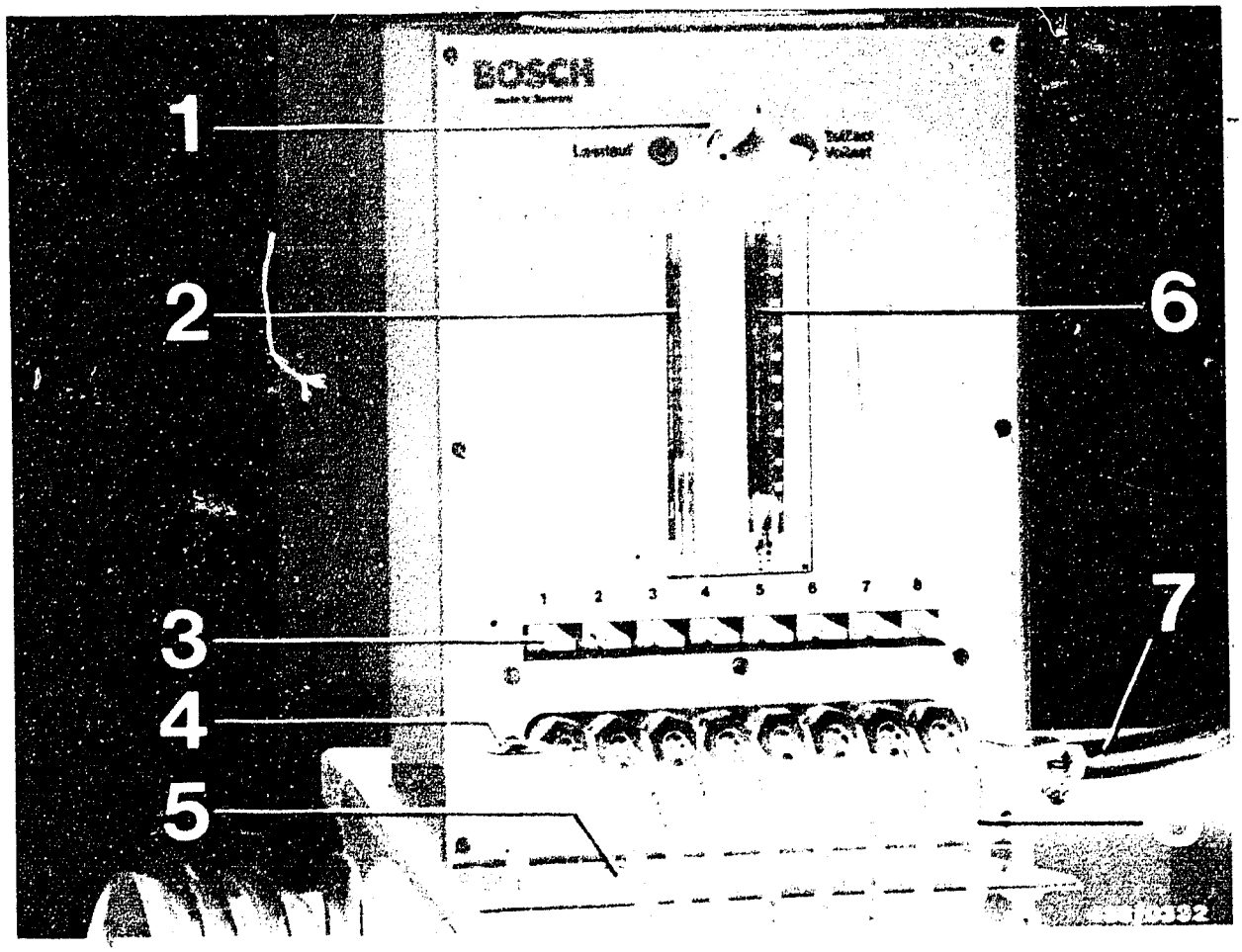
This test is carried out using the tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451).

18.1 Application

By means of comparative measurements, the differences in the amounts of fuel delivered from the individual outlets on the fuel distributor are determined.

The tester is designed so that the test can be made on the vehicle without having to remove the fuel distributor.

Since the test is made with the original injection valves, the operator can recognize at the same time whether delivered-quantity scatter, if it occurs, is caused by the fuel distributor or by the injection valves.



1 = 3-way cock
2 = Small rotameter tube
3 = Keyboard
4 = Adjusting screw for setting up
5 = Spirit level
6 = Large rotameter tube
7 = Return hose
8 = Hose lines

18.2 Construction

The tester is designed for use with all engines, up to 8 cylinders, equipped with K-Jetronic.

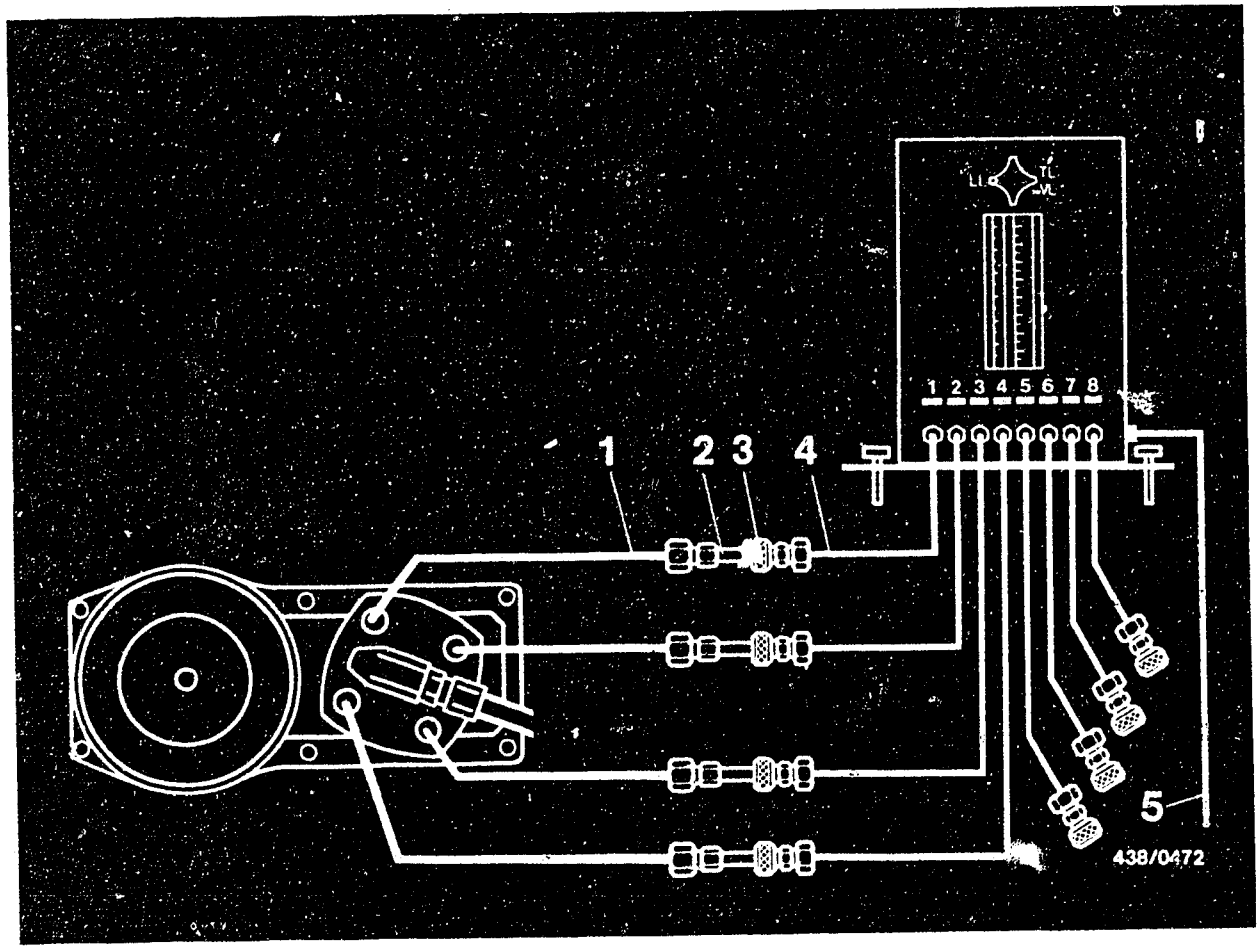
Basically, the tester consists of a steel housing containing 2 rotameter tubes with measuring ranges of 2...15 cm^3 and 10...180 cm^3, an 8-way valve for key operation (Item 3) and a 3-way stopcock (Item 1).

The small rotameter tube (Item 2) is used for the idle measurement while the large tube (Item 6) is used to measure the fuel delivery at part- and full-load. The particular rotameter tube to be used is connected by means of the 3-way stopcock. Using the 8-way valve, the fuel delivery of each cylinder is tested one after the other.

Attached to the tester are 8 hoses (Item 8), each terminated with an automatic connector. When the injection valves are withdrawn from their sockets on the engine they are attached to these connectors. Each automatic connector is fitted with a push valve so that no fuel can escape from connectors that are not in use (when 4- or 6-cylinder systems are tested).

The fuel is returned to the fuel tank through a hose (Item 7) about 5 m long.

The entire test is made with a closed circuit, i.e. no fuel escapes.



1 = 1979 model: fuel-injection lines

1980 model: Adapter lines from line set KDJE-P200/25. Connection to fuel distributor with double threaded fitting M 10 x 1/M 8 x 1.

2 = Injection valves
Connection to adapter lines on the 1980 model with double threaded fitting M 12 x 1.5/M 8 x 1.

3 = Automatic connectors

4 = Tester lines

5 = Return line to fuel tank filler neck.

18.3 Setting up and connecting the tester for delivered quantity comparison:

Set the tester up beside the vehicle on a solid base (e.g. on tester trolley KDJE-W100) and align it with the built-in spirit level at the base of the tester.

Connection on the 1979 model:

Remove the injection valves; the fuel-injection lines remain connected.
Clean the injection valves with a rag and insert in the appropriate order into the automatic connectors of the first four tester lines.
Note: Insert the injection valves as far as they will go and tighten the knurled thumbscrews well so that the non-return valves of the automatic connectors are opened fully.
Introduce the return hose of the tester into the fuel tank filler neck.

Connection on the 1980 model:

So that the rigid fuel-injection lines are not bent too much, the tester for delivered quantity comparison is connected using the adapter lines KDJE-P200/25.

Remove the injection valves completely.

Unscrew the fuel-injection lines from the fuel distributor and connect four adapter lines instead using the double threaded fitting M 10 x 1/M 8 x 1.

Connect the injection valves to the adapter lines using the double threaded fitting M 12 x 1.5/M 8 x 1.

Clean the injection valves with a rag and insert injection valves into the automatic connectors of the first four tester hoses.

Note:
Insert the injection valves as far as they will go and tighten the knurled thumbscrews well so that the non-return valves of the automatic connectors are opened fully.

18.4 Bleeding the tester:

Remove the rubber hood so that the air-flow sensor plate becomes accessible.

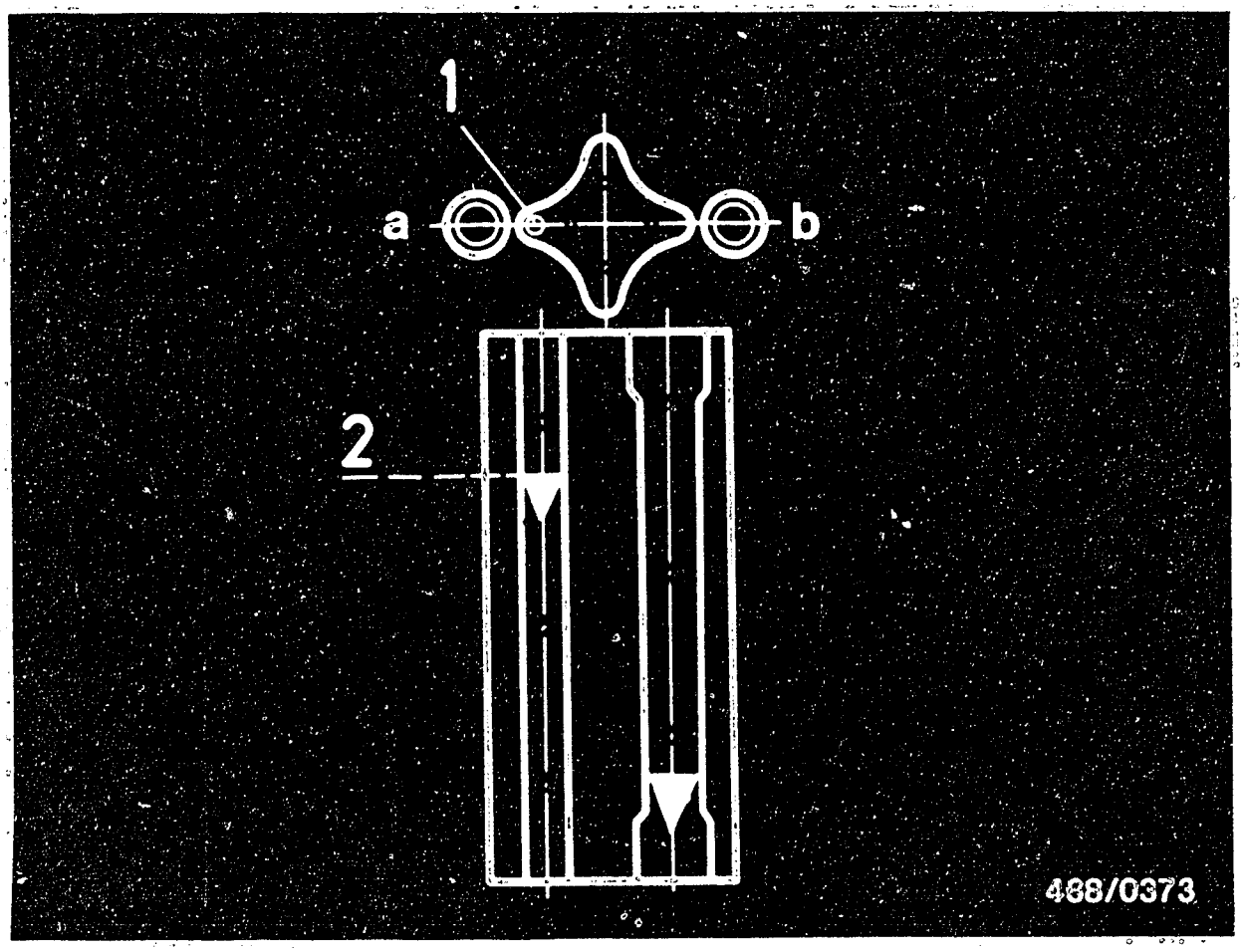
Remove the electric plugs from the warm-up regulator and the auxiliary-air device.

Switch on the electric fuel pump by bridging the electrical safety circuit.

Raise the air-flow sensor plate to the stop.

Press the keys on the 8-way valve one after the other, while simultaneously switching the 3-way stopcock until both rotameter tubes are bled.

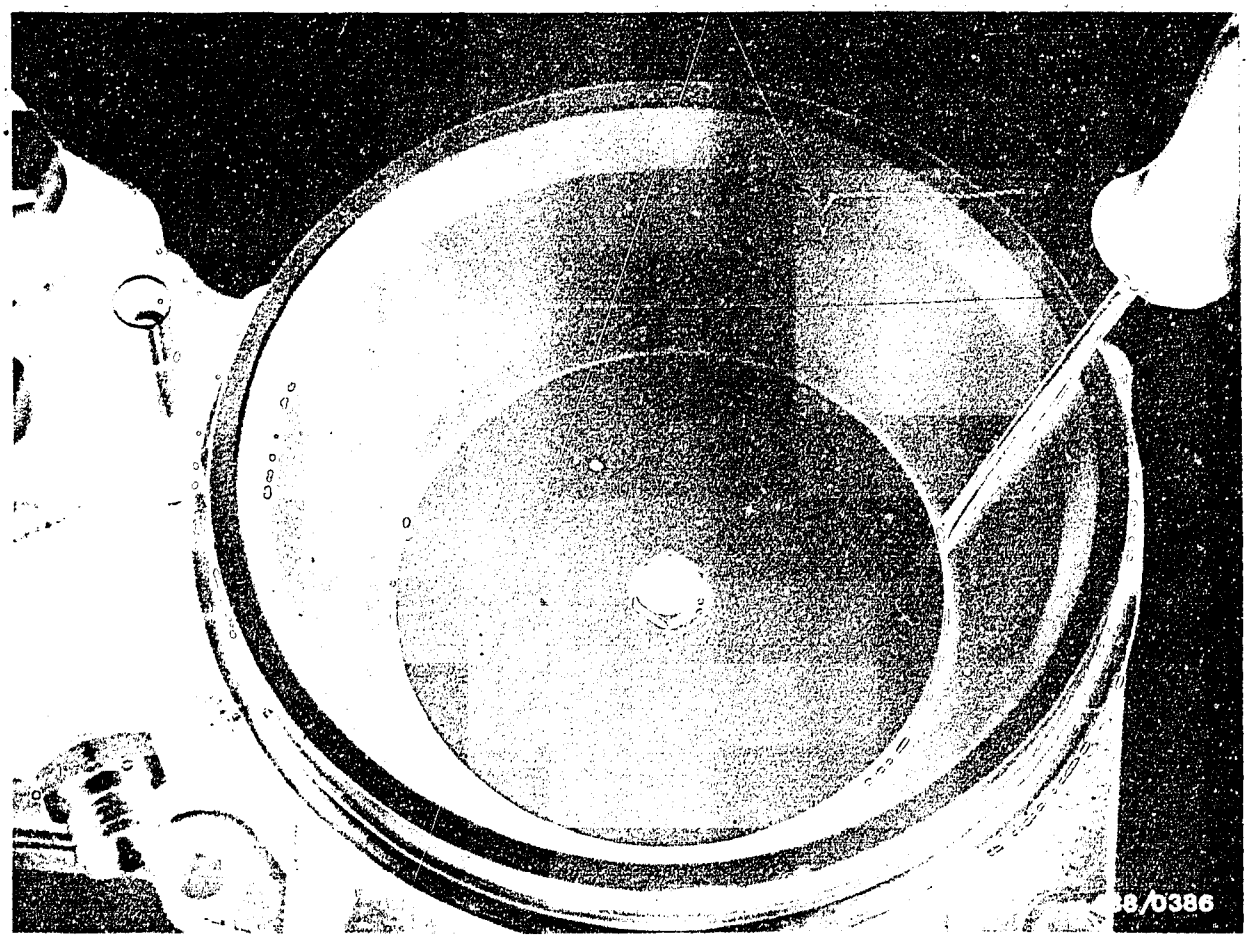
Return the sensor plate to the rest position.



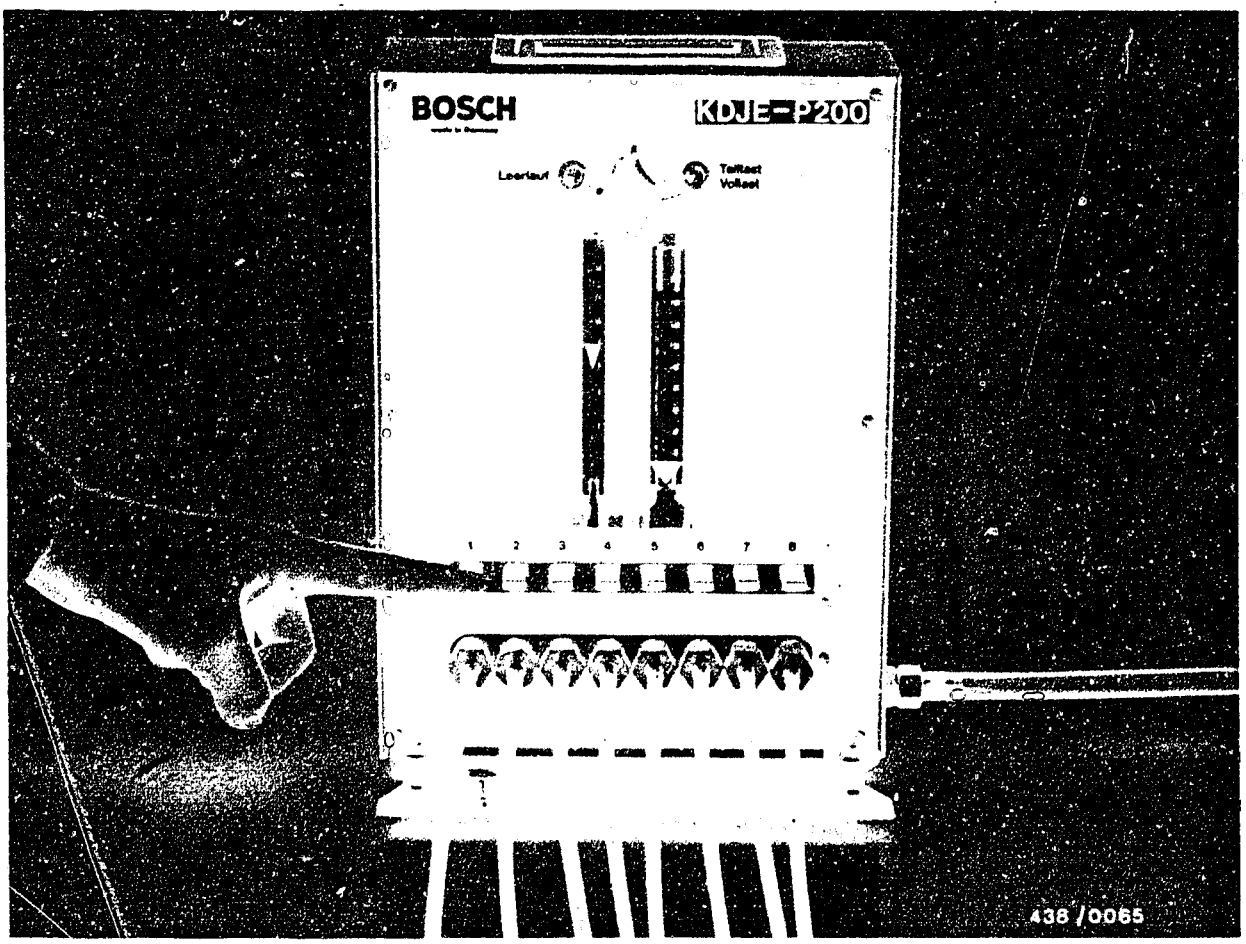
1 = White dot
2 = Measuring line
a = Idle
b = Part load/full load

18.5 Testing:

The flow comparison measurement is made in the idle, part-load and full-load ranges.
The small rotameter tube is to be used for the idle measurement (white dot to left on control knob); part-load and full-load measurements are made using the large rotameter tube (white dot to right).
The delivered quantities indicated on the rotameter tubes are read off at the top edge of the conical float (Item 2).
On testers with a ball float the uppermost point of the ball is used for reading off. With each measurement be sure to wait until the float has reached its final position. This may take 20...30 seconds in the case of small deliveries.



The exact setting and locating of the position of the air-flow sensor plate for the various load ranges is done using a screwdriver (a small one for the idle-position), which is inserted to an appropriate depth between the air funnel and air-flow sensor plate.



Procedure:

Switch on the electric fuel pump by bridging the electrical safety circuit.
Fixed numerical values are specified in the following test section for the maximum permissible fuel delivery differences for the individual load ranges.

The "set point" value always pertains to the fuel-distributor outlet with the lowest fuel delivery, i.e. in each case the outlet with the lowest delivery is to be first ascertained.

Press the key for outlet 1. Pivot the air-flow sensor plate until the corresponding rotameter tube approximately indicates the "set point" value. Fix the air-flow sensor plate in this position.

Test the remaining outlets in order to determine which outlet has the lowest fuel delivery.

Press the key for this outlet again, and set the delivery precisely to the "set point" by correcting the position of the air-flow sensor plate. Then fix the air-flow sensor plate in this position again.

Press the remaining keys one after the other, and determine the maximum fuel delivery of each outlet. A deviation in fuel delivery can only be above the "set point".

18.6 Test specifications

	Setpoint cm^3/min	Max. permissible fuel delivery cm^3/min
Idle	6.0	6.8
Part load	40.0	44.0
Full load	160.0	175.0

If, in testing, a too large difference is ascertained in one of the three load ranges, the test should for safety's sake be repeated.

If the result is confirmed, you should check whether the fault lies in the fuel distributor or in the injection valves.

To do this interchange the injection valves with the greatest and smallest difference.

If the result is still the same, the fault is in the fuel distributor. If the fault follows the interchanged injection valves, it lies in the injection valves.

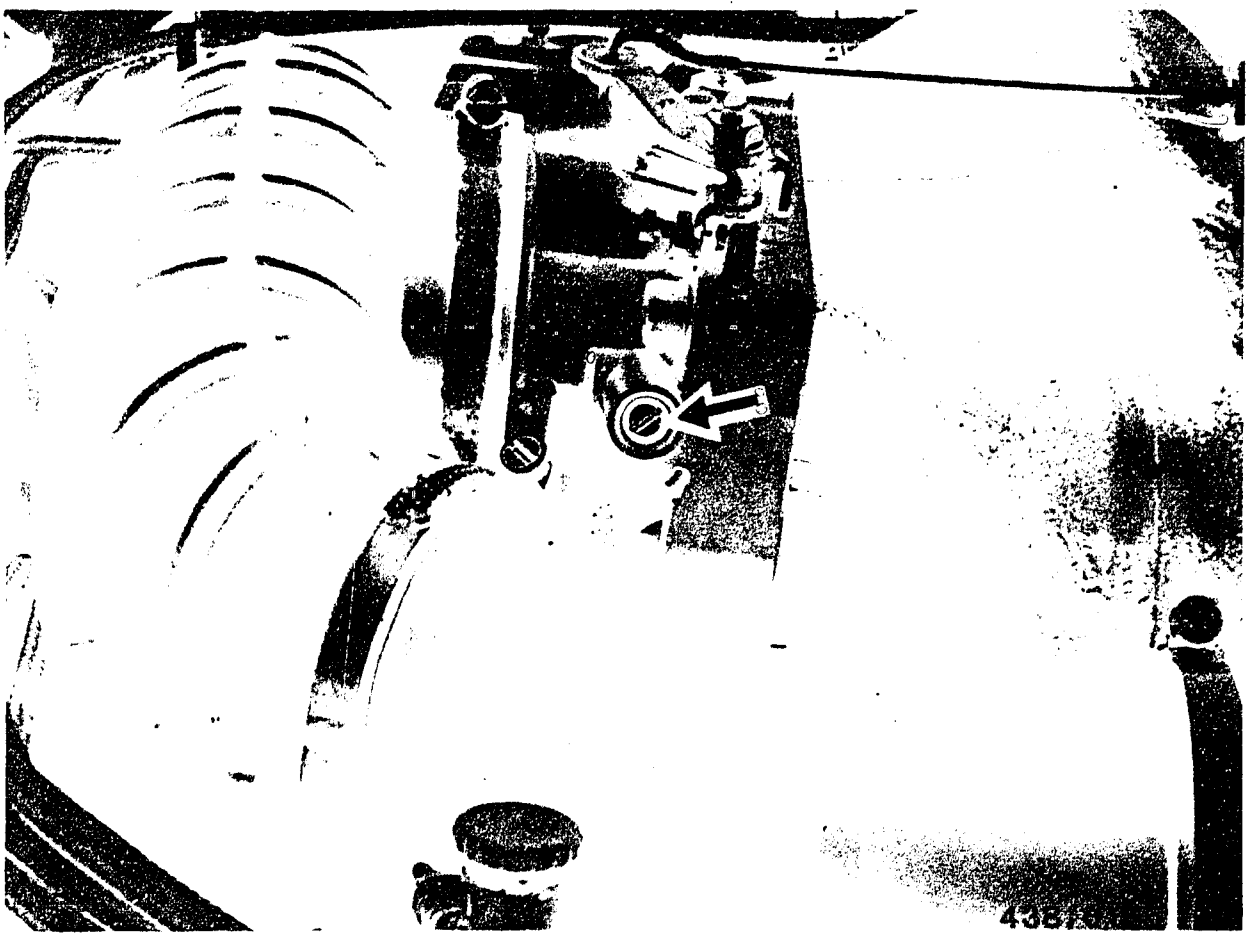
Change defective fuel distributor and/or replace defective injection valves.

18.7 Final operations

Re-fit the injection valves properly. Also fit the air filter or rubber hood. Make sure that all lines are laid correctly.

Re-connect the electrical safety circuit of the K-Jetronic properly.

Use a trial run to check that there are no leaks in line connections.



19. Idle adjustment

The engine must be at normal operating temperature for the idle adjustment - oil temperature approx. 80°C.

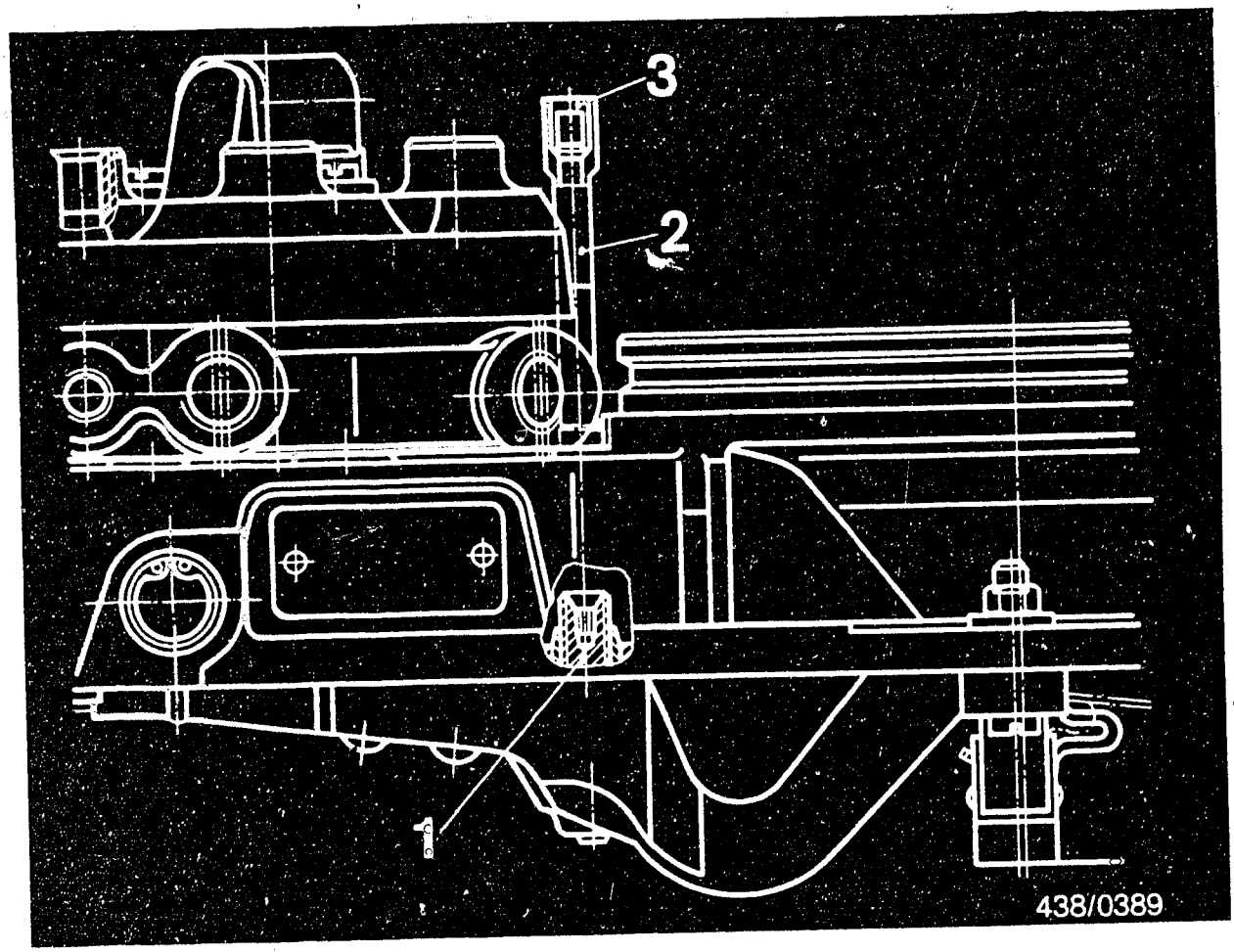
Engine-speed measurement with separate tachometer.

The operating levers on the throttle-valve assembly for the two throttle valves have been permanently set at the factory. The adjusting screws have a lead seal and must not be changed.

19.1 Test specifications for idle adjustment:

Idle speed: 900...1000 min^{-1}.
CO concentration (% by vol.): 1.0...2.0 %

Adjust the idle speed at the bypass screw on the throttle-valve assembly (arrow).



Adjusting the CO concentration by turning the idle-mixture-adjusting screw (1) in the mixture-control unit using the adjusting wrench KDEP 1035.

After removing the safety cap (3) of the guide tube (2), the adjusting wrench is passed through the guide tube and inserted into the idle-mixture-adjusting screw.

Turning to the right = richer mixture
Turning to the left = leaner mixture

Caution: Always make the adjustment from the lean side, i.e. if the mixture is too rich turn the idle-mixture-adjusting screw further to the left than necessary and then turn it to the right up to the setting required.

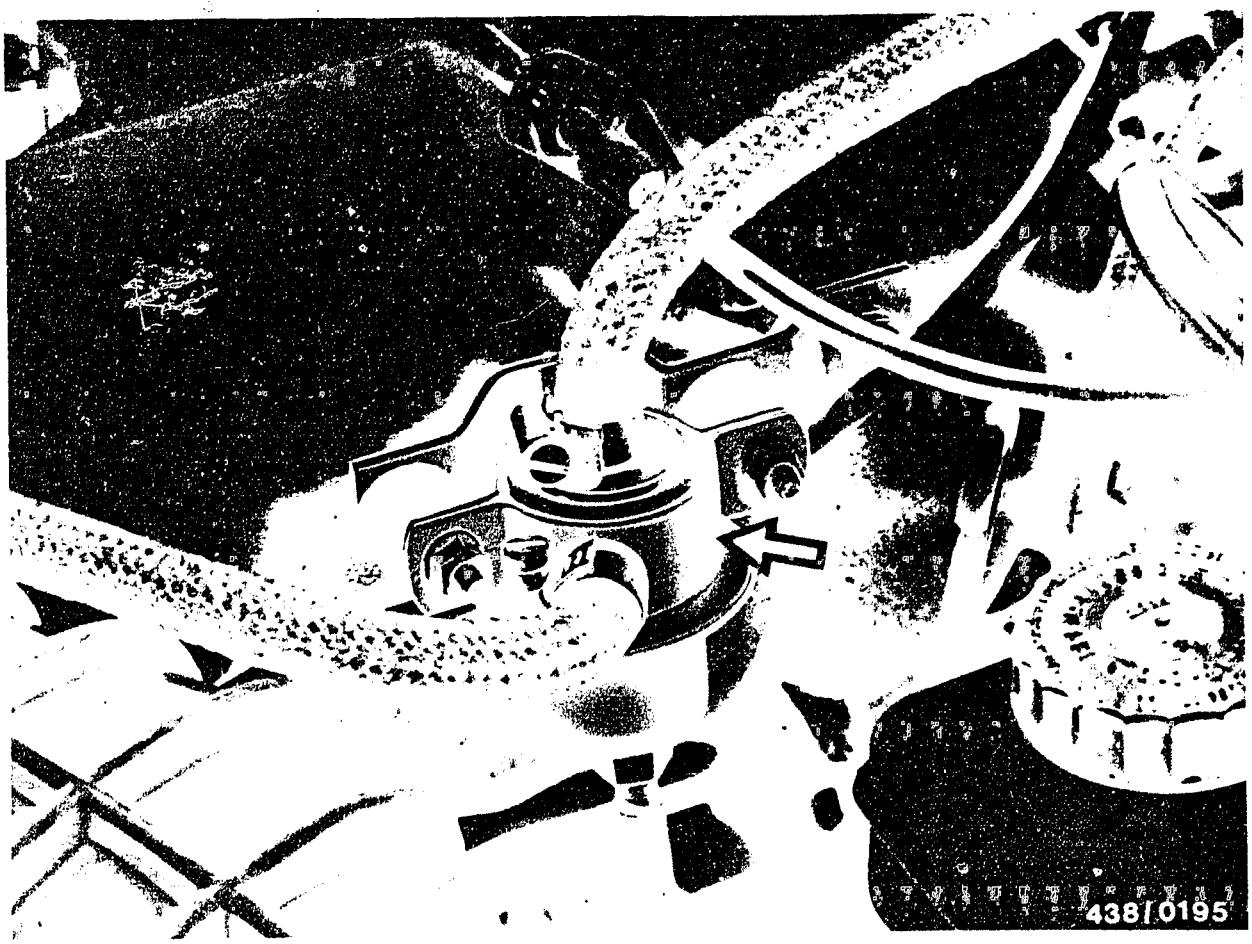
After every adjustment remove the adjusting wrench and accelerate the engine briefly, so that the air-intake system can cool off. Then wait until the indicator of the CO tester has stabilized. Never accelerate the engine with the wrench still in place as this could result in bending the control lever in the air-flow sensor.

Anti-tamper device for idle-mixture-adjusting screw:

In the Federal Republic of Germany, § 47 of the FMVSS/ CUR, "Exhaust Gases and their Discharge", has been amended. This amendment order was printed in full in the Verkehrsblatt 13 of 15th July 1975.

Accordingly, all motor vehicles with externally supplied ignition produced as of 1 October 1976 must be provided with anti-tamper devices for the idle-mixture-adjusting screw so that it is not possible to adjust the screw without destroying the anti-tamper device. The intention is to prevent non-experts from re-adjusting the idle setting and thus inadmissibly influencing the exhaust gas. Consequently, the anti-tamper caps may only be used in the workshop and must not be sold to customers for their own use.

These anti-tamper caps come in different colors. The cap to be used for the after-sales service is red. It can be obtained from Bosch under part number 3 430 522 002.



19.2 Checking the vacuum limiter

The vacuum limiter is installed in the 1979 export models with manually-shifted transmission for USA, Canada, Japan, Australia and Sweden.

This is a vacuum-controlled auxiliary-air device which opens only on the overrun. In all other operating conditions the vacuum limiter must be tightly closed.

It can be checked as follows:

Measure the idle speed with the vacuum limiter closed (engine at normal operating temperature). Then switch off the engine.

Remove the hose connection before the throttle valve on the throttle-valve assembly and seal off tight the hose and the tailpiece. Start the engine again and measure the idle speed. It must not differ from the previous measurement. If the speed has dropped, the vacuum limiter has a leak.
If it is leaking badly, the idle speed is too high and can no longer be adjusted.

Replace the vacuum limiter if leaking.

If the vacuum limiter has had to be replaced, subsequently check or repeat the idle adjustment.

After-sales Service

Technical Bulletin

Packaging of goods under warranty

438

K-Jetronic (CIS)

VDT-I-438/101 B
10.1976

All components or assemblies of the K-Jetronic which are dispatched under warranty must be correctly and carefully packaged so that no further damage or impairments occur during transit, since these would not be covered by warranty.

Any fuel remnants must be removed from those K-Jetronic assemblies intended for dispatch, so as to eliminate any danger of fire during transit.

The intake openings and outlets of the assemblies must be sealed off with caps or plugs. As new products were fitted, the caps or plugs from these may be used.

The plunger of the fuel distributor is to be fitted with a protective cap of adequate size, or secured to the fuel distributor.

In addition, the assemblies are packed in tightly packed, well-sealed plastic sleeves. Fuel distributors and warm-up regulators are packed individually.

If components arrive damaged due to incorrect packaging or do not comply with these instructions, they can be returned and the warranty claim rejected.

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After-sales Service

Technical Bulletin

Securing of idle-speed adjusting screws

K-Jetronic (CIS)

438

VDT-I-438/102 B
11.1976

According to a statutory regulation, changes have been made to § 47 of the German traffic licensing laws concerning exhaust gases and their outlets. This regulation was printed in full in traffic law sheet 13 of 15.7.75 .

Consequently, all motor vehicles with external-ignition engines must have their idle-speed adjusting devices secured from the 1st October 1976, so that adjustment of the screw is impossible without destroying the securing device. This should stop unskilled people from adjusting the installation of the idle-speed system and thereby illegally influencing the emission values. As from now, securing caps can only be used in the workshop and cannot be sold to customers for their own use.

Securing caps are produced in various colors. For after-sales service the following caps and colors are used:

downdraft air-flow sensor
Blue — securing cap is not available from BOSCH. Part number is DB 000.997.59 86 from the Deutsche Vergaser Gesellschaft K 34 520

updraft air-flow sensor
Red — Part number 3 430 522 002

These stipulations are only valid in countries where ECE regulations (Economic Commission for Europe) apply. The air-flow sensors must however be converted for the use of these securing caps, as a matter of principle. The caps can also be used in countries not subject to ECE regulations, to prevent dirt penetrating through the pipe to the adjustment in the case of updraft air-flow sensors.

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After-sales Service

Technical Bulletin

SUPPLY PUMPS 0 580 ..

Overview of the non-return valves

Replaceable non-return valves

Part Number	Appropriate seal ring	Fitted in supply pumps
1 583 385 004	1 580 203 002	0 580 254 990, ..991,..998
.. 006	.. 002	.. 985
1 583 386 008	.. 001	.. 987, .988,..989
.. 011	.. 001	.. 986, ..996
.. 014	.. 001	.. 992
.. 016	1 580 105 001	.. 970, ..971,..972, .. 973, ..974,..980

Parts sets (comprising non-return valve complete with seal ring)

1 587 010 001	-	0 580 254 992
1 587 410 901	-	.. 978, ..982 FD823→

Supply pumps fitted with non-replaceable non-return valves

0 580 254 975, ..976, ..977, ..979 and ..982 → FD 822

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After-sales Service

Technical Bulletin

HOT-STARTING PROBLEMS

438

VDT-I-438/105 En
3.1980
Replaces Ed. 2.1980

K-Jetronic

Hot-starting problems can occur in various vehicles fitted with K-Jetronic. This means that when an engine is switched off whilst still hot and then switched on again after a short period, it does not start as well as it should.

The engine, the ignition system and the K-Jetronic system in these vehicles should be carefully checked. With the K-Jetronic particular attention should be paid to the:

complete system (in case of leaks),
injection valves (in case of leaks),
correct position of the air-flow sensor plate (rest position).

Instructions can be found in the vehicle-related repair manuals VDT-W-438/5.. .

If the engine still does not start satisfactorily when hot, even after checking, a timing relay can be fitted in K-Jetronic systems which are not equipped with a solenoid valve for reducing the control pressure as additional starting help.

Timing relay 0 340 000 003 controls the start valve during hot starts. The start valve then injects extra fuel intermittently (sometimes cutting out completely.

The timing valve is fitted according to the wiring diagram (see reverse side). The fitting of this relay will be charged for.

After fitting the timing relay starting should be carried out as follows:

Vehicles with start valve in intake manifold - with open throttle valve,
Vehicles with start valve in idle duct - with closed throttle valve.

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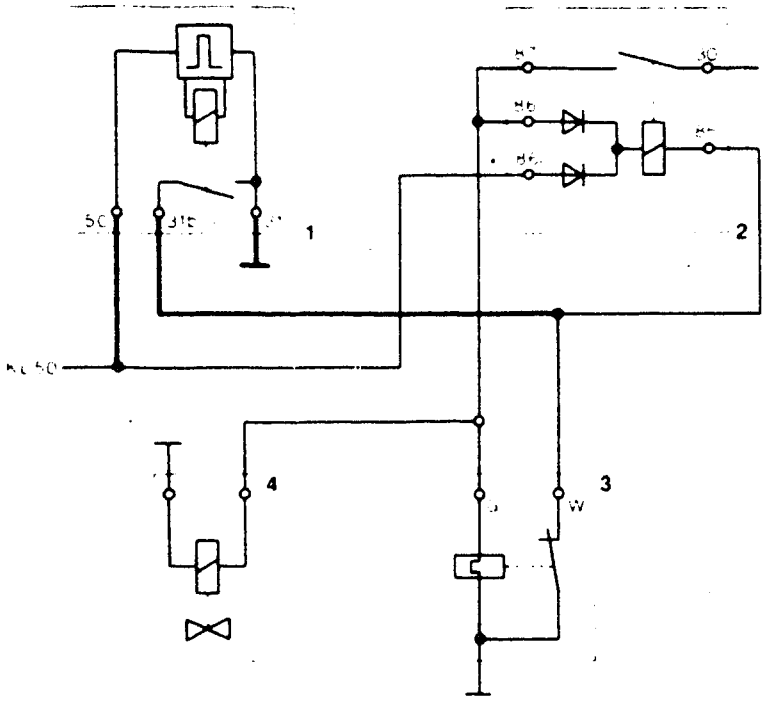
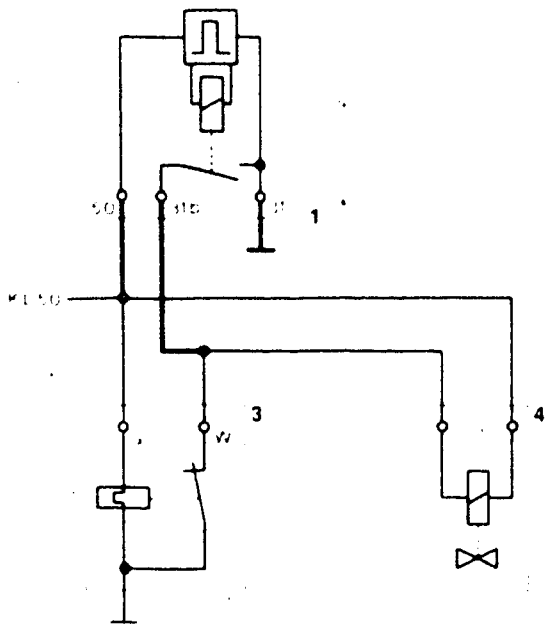


K-Jetronic system with post-injection relay

1 = Timing relay 0 340 000 003
2 = Post-injection relay
3 = Thermo-time switch
4 = Start valve



K-Jetronic system without post-injection relay

After-sales Service

Technical Bulletin

TUBE FITTING WITH FILTER IN WARM-UP REGULATOR 0 438 140 ...

VDT-I-438/106 En
4.1980

Warm-up regulator 0 438 140 065, used in MB 230 E, has a filter in the tube fitting for the fuel inlet to prevent dirt getting in.

When other warm-up regulators with the same connections give trouble or fail because of dirt getting in, then we recommend that you fit the new warm-up regulator with this tube fitting with filter, part no. 1 433 356 802.

During assembly a flat seal ring A 10 x 14 DIN 7603-C-CU, part no. 2 916 710 649, is laid underneath and the tube fitting is tightened with 20...22 Nm (2.0-2.2).

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After-sales Service

Technical Bulletin

FIRMLY FITTED NON-RETURN VALVE

VDT-I-438/107 En

Repairs
fuel pumps 0 580 254 ...

5.1980

Previously fuel pumps with non-exchangeable non-return valve (see VDT-I-438/104 En) had to be exchanged completely in cases of leakage in the non-return valve.

If the fuel pump is in working order and only the non-return valve leaks, there is now the possibility of repairs as part of after-sales service. 2 parts sets have been produced for this purpose, they contain, amongst other things, a tube fitting with built-in non-return valve.

Before using the parts set the installation conditions should be checked. The defective non-return valve can remain in the fuel pump which does not have to be dismantled for fitting the parts set. Before disconnecting the fuel lines the pressure fittings of the fuel pump and the fuel lines should be thoroughly cleaned.

Description and fitting

Parts set 1 587 010 003 for fuel connection with inlet union.

Screw the tube fitting (short side) with the thick flat seal ring into the pressure fitting and tighten. In doing so press against the hexagon of the pressure fitting with a wrench. Place the thin flat seal ring, the fuel-line inlet union and the other flat seal ring on to the long side of the tube fitting and tighten with the hexagon cap nut. Run the engine and check that there are no leaks in the connection.

Parts set 1 587 010 004 for fuel connection with nipple and union nut.

Screw the tube fitting with flat seal ring into the pressure fitting and tighten. In doing so press against the hexagon of the pressure fitting with a wrench. Screw the fuel line to the tube fitting with a union nut and tighten. Run the engine and check that there are no leaks in the connection.

BOSCH Geschäftsbereich KH Kundendienst Kfz Ausrüstung

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